Ambient Air Quality Monitoring
Opportunity and Warm Springs Sites
First Quarter of 2009

Prepared for

Anaconda Deer Lodge County

April 2010

Kuipers & Associates
PO Box 641
Butte, MT 59703
(406) 782-3441

Table of Contents

1.0 INTRODUCTION

This quarterly report documents the ambient air quality monitoring program conducted by Kuipers & Associates on behalf of Anaconda Deer Lodge County at Opportunity and Warm Springs locations adjacent to the Atlantic Richfield Lower Waste Management Area. The months of January through March 2009 are included in this quarterly report, with a more detailed data summary in the monthly reports.

Objectives of this quarterly report include the following:

- Summarize the PM10 and Total Suspended Particulate (TSP) data on a quarterly basis and compare to applicable standards.
- Compare daily average TSP values recorded by the Opportunity Site against the PM10 values reported by the Atlantic Richfield Company's South Site.
- Present summarized meteorological data for the quarter.
- Present summarized results for ambient dust sampling conducted during the quarter.
- Present the Data Quality Summary (PM10, TSP and meteorological).
    - Review the hourly data according to the Environmental Protection Agency's Air Quality System Null Data Qualifier Codes.
    - Format hourly PM10 and TSP data for each month to fit the Environmental Protection Agency's Air Quality System raw data template.

Figure 1 shows the ADLC monitoring locations in Opportunity and Warm Springs, and the Atlantic Richfield Company’s South Site monitoring location.


ADLC Warm Springs PM10
ARCO North PM10
ADLC Opportunity TSP
ARCO South PM10
Feet
0 625 1,250 2,500 3,750 5,000
N
Water & Environmental Technologies
Anaconda Deer Lodge County
Air Quality Monitoring points
Figure 1

2.0 PM10 AND TSP DATA SUMMARY

The Met One E-BAM portable PM10 monitor at Warm Springs and the TSP monitor at Opportunity collected continuous hourly data at both locations from January 1 through March 31.

During the period of operation, data recovery was 97.4% at Opportunity and 96.5% at Warm Springs. Detailed ambient air quality monitoring results for the first quarter of 2009 are summarized in the January, February and March monthly reports prepared by Kuipers & Associates. A general discussion of ambient air quality monitoring data from the first quarter of 2009 is provided in the following sections. All PM10 and TSP data are reported at Local temperature and pressure (LTP) conditions.

2.1 Opportunity Site

At the Opportunity location daily average TSP concentrations ranged from non-detect to 27 $\mu g/m^3$ with an average of 7 $\mu g/m^3$ throughout the first quarter. The maximum daily average TSP reading of 27 $\mu g/m^3$ was observed on January 19, in conjunction with light north-northeasterly and southwesterly winds. This episode did not occur on an ARCO PM-10 run day, so the results couldn't be compared. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 41 $\mu g/m^3$ in January, 24 $\mu g/m^3$ in February and 49 $\mu g/m^3$ in March. Daily average TSP concentrations for the quarter are presented in Figure 2 for the Opportunity monitoring site, and also in Appendix A.

Currently, there is no ambient air quality standard for TSP. However, all daily average TSP results for the first quarter of 2009 at Opportunity were well below the historical 24-hour Montana Ambient Air Quality Standard of 200 $\mu g/m^3$.

No Opportunity TSP data from the first quarter was rejected or omitted for quality assurance or quality control check results. Minor data losses occurred due to maintenance activities and power outages. However, a total of 19 hours of TSP data were excluded from analysis because of concern that snowfall events may have affected those readings.

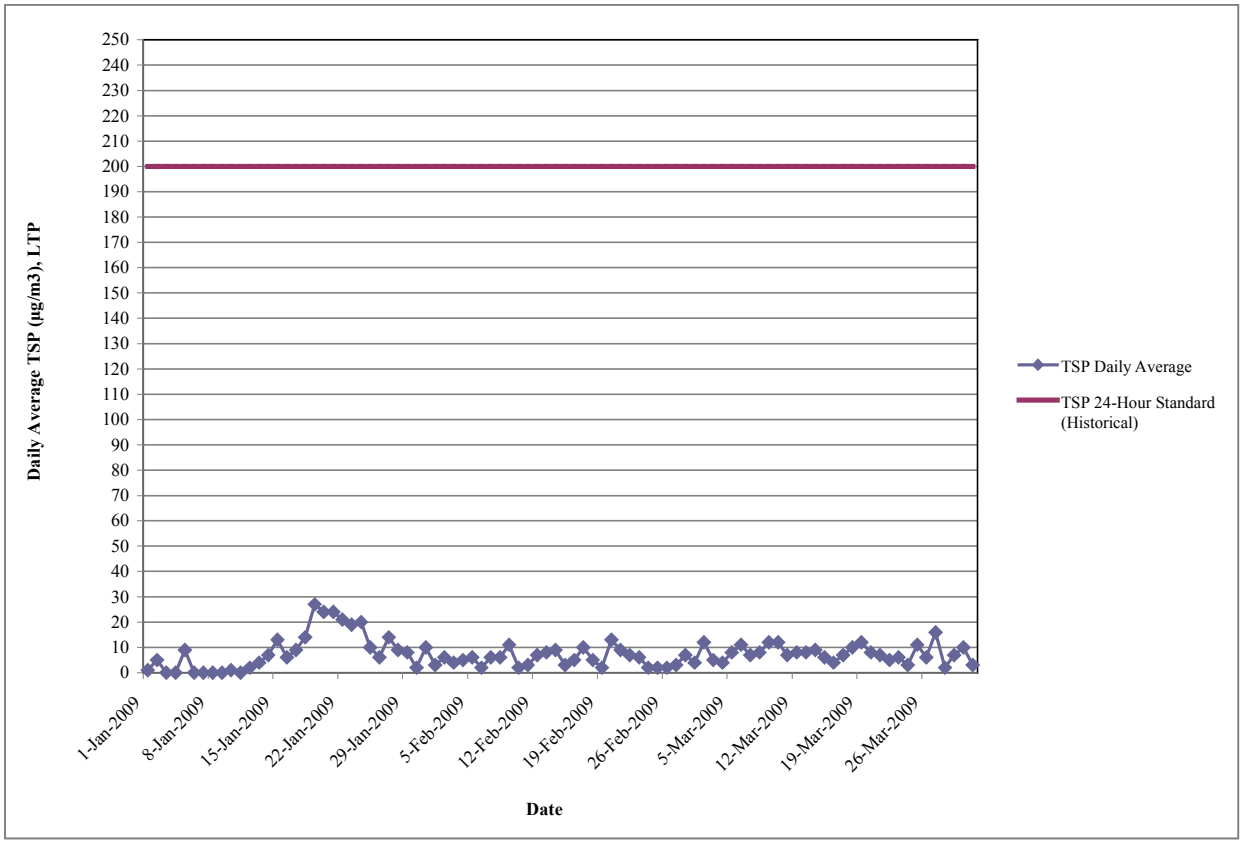


FIGURE 2– OPPORTUNITY SITE DAILY AVERAGE TSP CONCENTRATION

2.2 Warm Springs Site

At the Warm Springs location daily average PM10 concentrations ranged from non-detect to 14 µg/m^3 with a quarterly average of 3 µg/m^3. The maximum daily average PM10 reading of 14 µg/m^3 was observed on January 20, and was associated with light and variable winds. There is considerable hourly variability on many days; on average the maximum daily one-hour concentration was 24 µg/m^3 in January, 17 µg/m^3 in February and 21 µg/m^3 in March. Daily PM10 average concentrations for the first quarter are presented in Figure 3 for the Warm Springs monitoring site, and also in Appendix A.

All daily average PM10 results for the first quarter of 2009 at Warm Springs were well below the 24-hour Montana Ambient Air Quality Standard of 150 µg/m^3. No Warm Springs PM10 data from the first quarter was rejected or omitted for quality assurance or quality control reasons. Minor data losses occurred due to maintenance activities and power outages. However, 17 hours of PM10 data were excluded from analysis because of concern that snowfall events may have affected those readings.

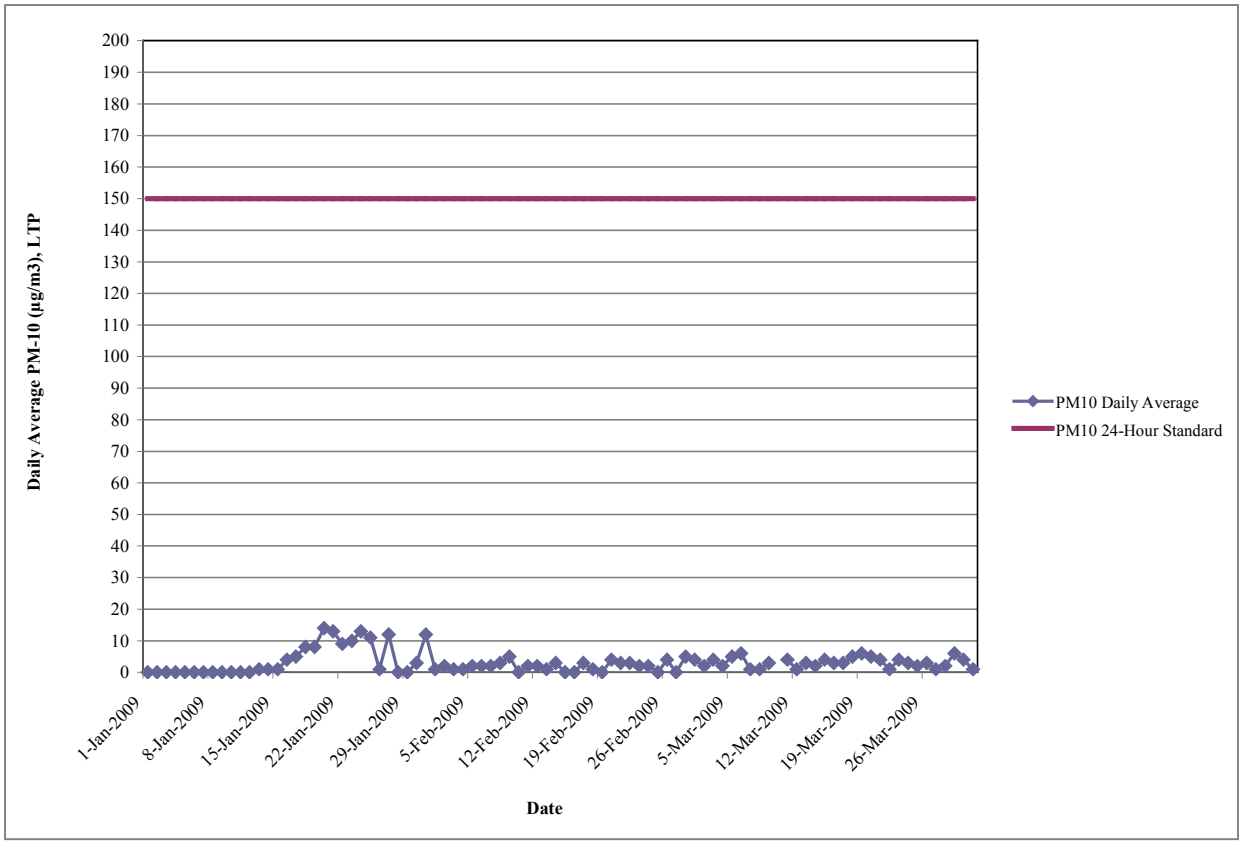


FIGURE 3 - WARM SPRINGS SITE DAILY AVERAGE PM10 CONCENTRATION

3.0 COLLOCATED PARTICULATE MONITORING RESULTS COMPARISON

Daily average (24-hour) results from the ADLC E-BAM TSP monitor at the Opportunity site were compared to the Atlantic Richfield Wedding PM10 monitors at the South Site for the quarter. The ADLC monitor collects screening level data, while the Atlantic Richfield monitors follow a federal reference method (FRM) required for compliance with air quality standards. While these are different measurements, collocated PM10 data collected at Opportunity from May 2007 through June 2008 indicated good general agreement between the E-BAM and Wedding PM10 monitoring systems. Therefore, a comparison of the E-BAM TSP data versus Wedding PM10 data should provide an indication of the ratio of total airborne particulate to the inhalable fraction (PM10).

The individual collocated results are listed in Table 1, and depicted graphically in Figure 4. While the ratio shows high day-to-day variability –particularly at lower concentrations – on average the total amount of airborne particulate (TSP) was approximately triple the amount of inhalable particulate (PM10). This relationship is fairly consistent whether one calculates the average of the daily TSP/PM10 ratios (3.15), or a total mass ratio (2.99). This is higher than the ratio of roughly 2:1 observed during the fourth quarter of 2008, but similar to the ratio of roughly 3:1 observed during the third quarter of 2008. The diagonal line on Figure 4 represents a best-fit linear regression of TSP against daily average PM10 values.

TABLE 1 – COLLOCATED RESULTS FOR TSP VS. PM10
DAILY AVERAGE VALUES
FIRST QUARTER 2009
(All values are $\mu g/m^3$ at Local temperature and pressure (LTP))

Date	Standard ARCO - PM-10 Wedding FRM South Site	Test ADLC - TSP Met One E-BAM Opportunity Site	TSP as Percent of PM-10	TSP as Percent of PM-10 Cumulative
January 7, 2009	1	0	0	0
January 10, 2009	1	1	100	50
January 13, 2009	0	4	N/A	250
January 16, 2009	3	6	200	220
January 19, 2009	11	27	245	238
January 22, 2009	5	21	420	281
January 25, 2009	0	10	N/A	329
January 28, 2009	1	9	900	355
January 31, 2009	1	10	1000	383
February 3, 2009	2	4	200	368
February 6, 2009	1	2	200	362
February 9, 2009	5	11	220	339
February 12, 2009	3	7	233	329
February 15, 2009	1	3	300	329
February 18, 2009	1	5	500	333
February 21, 2009	6	9	150	307
February 24, 2009	0	2	N/A	312
February 27, 2009	2	3	150	305
March 2, 2009	3	12	400	311
March 5, 2009	3	8	267	308
March 8, 2009	3	8	267	306
March 11, 2009	1	7	700	313
March 14, 2009	7	9	129	292
March 17, 2009	0	7	N/A	303
March 20, 2009	0	8	N/A	316
March 23, 2009	3	6	200	311
March 26, 2009	5	6	120	297
March 29, 2009	2	7	350	**299**

Mean	315
Maximum	1000
Minimum	0

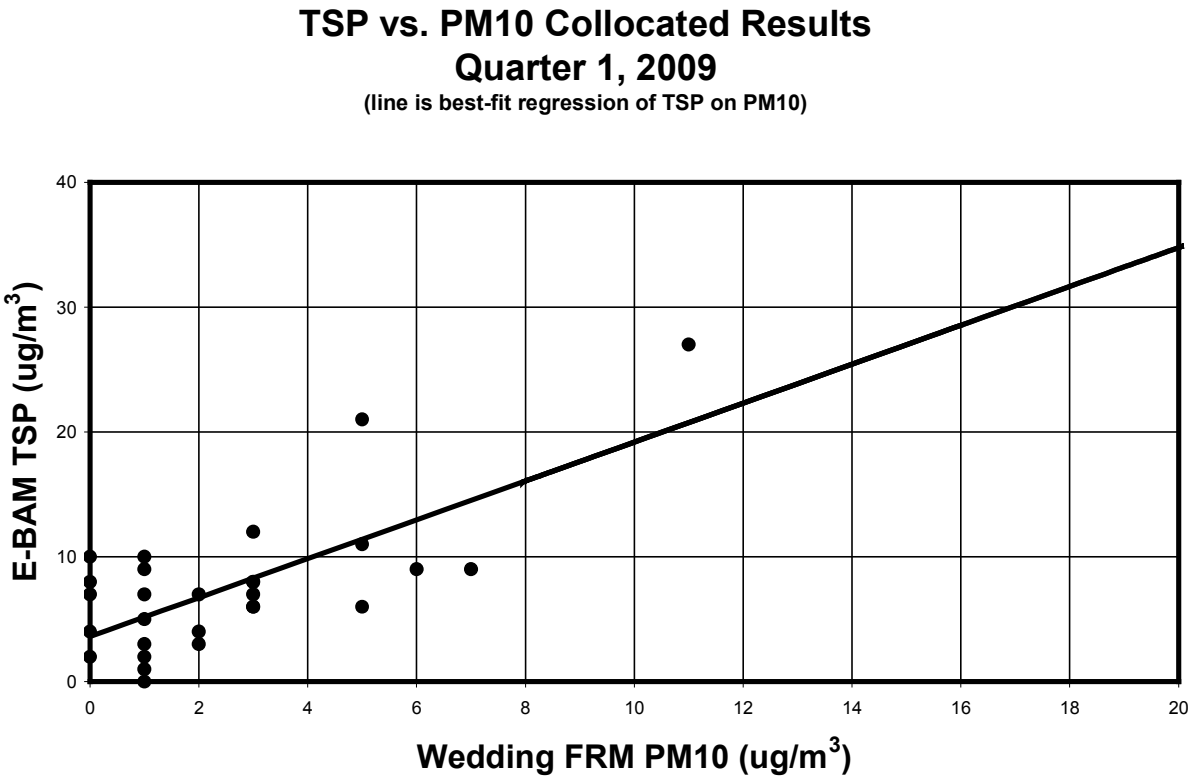


FIGURE 4 – COLLOCATED RESULTS COMPARISON FOR ADLC OPPORTUNITY E-BAM (TSP) AND ATLANTIC RICHFIELD WEDDING FRM (PM10)

4.0 DUST MONITORING RESULTS

Starting August 15, 2008, clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes and submitted for analysis. The samples were analyzed for arsenic, cadmium, copper, lead and zinc, as well as total dust weight.

Settled dust samples were collected at both sites during the first quarter of 2009, but the Warm Springs sample was not analyzed due to the very small (<1.0 mg) mass collected. Results for Opportunity are summarized in Table 2. Because of the small amount of particulate collected, the results must be considered of screening-level quality. A memorandum discussing the collection and analysis of the dust samples is presented in Appendix B, including any data quality concerns. The laboratory analysis report is presented in Attachment 1.

Additional sampling using dustfall jars was implemented in October 2008, but initial results were not reported because of laboratory weighing resolution issues. However, results for samples collected ending January 6, 2009 and March 2, 2009 are summarized in Table 2. Results for arsenic and lead were of comparable magnitude to those found in previous settled dust samples. Meaningful results for two of the samples ending March 2 could not be calculated due to trace element contamination in the isopropyl alcohol that was used to prevent freezing, so they were excluded from this report. Because of the trace element contamination issue, the use of isopropyl alcohol was discontinued after March 2.

Selected exposed filters from the ARCO South samplers at Opportunity are analyzed for arsenic and lead concentrations, in addition to PM10. Average concentrations of arsenic and lead for the ARCO samples were calculated for calendar year 2008 on a total mass basis, with a result of 140 mg/kg for arsenic and 188 mg/kg for lead. Although the sampling methods are much different, and the ARCO samplers collect only PM10 (rather than total particulate), the arsenic and lead concentrations found in the glass dish dust samples and dustfall samples are similar in magnitude to those calculated for the ARCO air samples.

TABLE 2 – SUMMARY OF DUST MONITORING RESULTS

Site / Sample Type	Collection Period	As (mg/kg)	Cd (mg/kg)	Cu (mg/kg)	Pb (mg/kg)	Zn (mg/kg)	Net Weight (mg)
Opportunity Settled Dust	11/28/08 to 03/02/09	164	5.8	657	133	1080	1.0
Opportunity Dustfall	12/01/08 to 01/06/09	128	9.11	453	60.7	424	18.4
Opportunity Dustfall	01/06/09 to 03/02/09	214	9.58	762	154	3610	4.4
Warm Springs Dustfall	12/01/08 to 01/06/09	146	3.23	412	43.0	437	33.8

5.0 METEOROLOGICAL DATA SUMMARY

Meteorological data were collected continuously and recorded hourly at both the Opportunity and Warm Springs E-BAM monitoring sites. Parameters monitored include wind direction, wind speed, temperature and relative humidity. The data were collected at a height of approximately eight feet above ground level.

Summarized meteorological data for these sites are presented and discussed in Sections 4.1 and 4.2. Detailed daily meteorological summaries are presented in Appendix A; information presented includes:

- Average, maximum and minimum air (shade) temperature for each day,
- Average and maximum hourly average wind speed for each day,
- Resultant wind direction for each day (weighted by wind speed – this is the mean direction from which the wind was blowing), and
- Average daily relative humidity.

Additionally, the summaries in Appendix A show the average daily and maximum daily PM10 and TSP concentrations, to facilitate correlation with the meteorological data.
Section 4.3 presents wind rose summaries for periods with elevated PM10 and TSP concentrations.

5.1 Opportunity Site

Figure 5 summarizes the meteorological data for the Opportunity site. Winds were generally light, averaging 2.3 m/s (5.1 mph). The highest recorded hourly wind speed was 8.5 m/s (18.3 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were above normal in January and February, and below normal in March. Monthly averages were –3.2°C (26.2°F) in January, -0.4°C (31.3°F) in February and –1.1°C (30.0°F) in March. Temperature extremes ranged from a low of –27.8°C (-18.0°F) in January to a high of 15.7°C (60.3°F) in March. The average humidity for the quarter was 61%, with considerable daily variation.

Winds at the Opportunity site were mostly from the southwest quadrant, though northerly and north-northeasterly winds also were somewhat common. The strongest winds tended to be from westerly through south-westerly directions, though strong northerly winds occasionally occurred.

Minor meteorological data losses occurred due to routine maintenance and short power outages, but none occurred due to data quality issues.

Part 1 – Means and Extremes

Parameter	January	February	March	Quarter
Average Wind Speed, m/s	2.4	2.3	2.4	2.3
Maximum (hourly) Wind Speed, m/s	8.5	6.3	7.9	8.5
Average Temperature, °C	-3.2	-0.4	-1.1	-1.6
Maximum Temperature, °C	7.9	12.4	15.7	15.7
Minimum Temperature, °C	-27.8	-12.0	-16.7	-27.8
Average Relative Humidity, %	62	58	63	61
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 1, 2009 Wind Rose

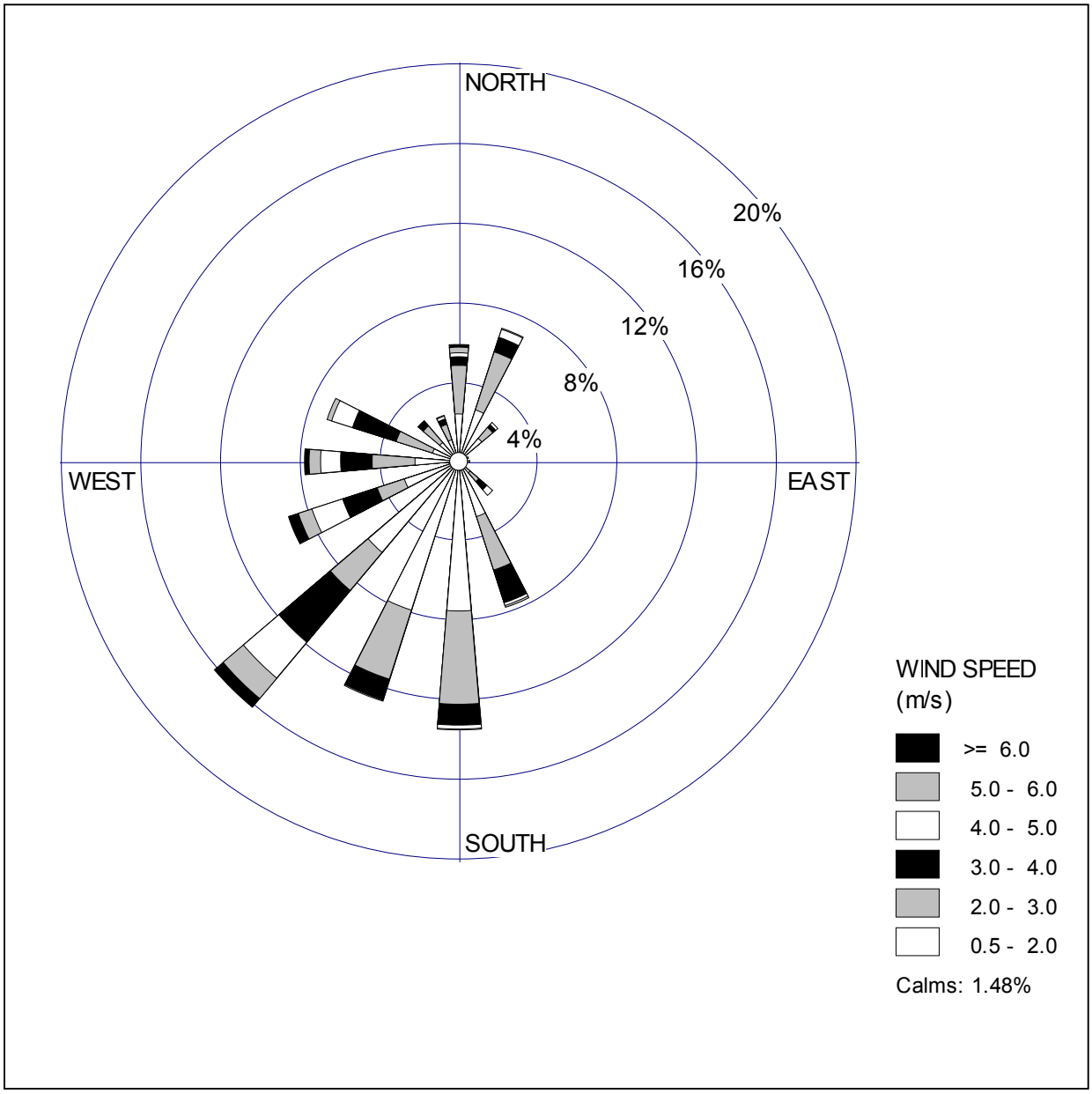


FIGURE 5 – METEOROLOGICAL SUMMARY FOR OPPORTUNITY SITE

5.2 Warm Springs Site

Figure 6 summarizes the meteorological data for the Warm Springs site. Winds were generally light, averaging 2.2 m/s (4.9 mph). The highest recorded hourly wind speed was 8.5 m/s (19.0 mph); it is likely that higher short-term gusts have occurred, but the system only monitors hourly average wind speed. Temperatures were above normal in January and February, and below normal in March. Monthly averages were –3.6°C (25.5°F) in January, -0.6°C (30.9°F) in February and –0.7°C (30.7°F) in March. Temperature extremes ranged from a low of –26.2°C (-15.2°F) in January to a high of 14.8°C (58.6°F) in March. The average humidity for the quarter was 62%, with considerable daily variation.

Winds at the Warm Springs site were mostly from southerly directions, though northerly winds also were common. The strongest winds tended to be from southerly directions.

Minor meteorological data losses occurred due to routine maintenance and short power outages, but none occurred due to data quality issues.

Part 1 – Means and Extremes

Parameter	January	February	March	Quarter
Average Wind Speed, m/s	2.2	2.0	2.2	2.2
Maximum (hourly) Wind Speed, m/s	8.5	6.1	7.7	8.5
Average Temperature, °C	-3.6	-0.6	-0.7	-1.6
Maximum Temperature, °C	7.8	12.1	14.8	14.8
Minimum Temperature, °C	-26.2	-16.6	-16.3	-26.2
Average Relative Humidity, %	63	59	63	62
Refer to Appendix A for detailed daily meteorological summaries.				

Part 2 – Quarter 1, 2009 Wind Rose

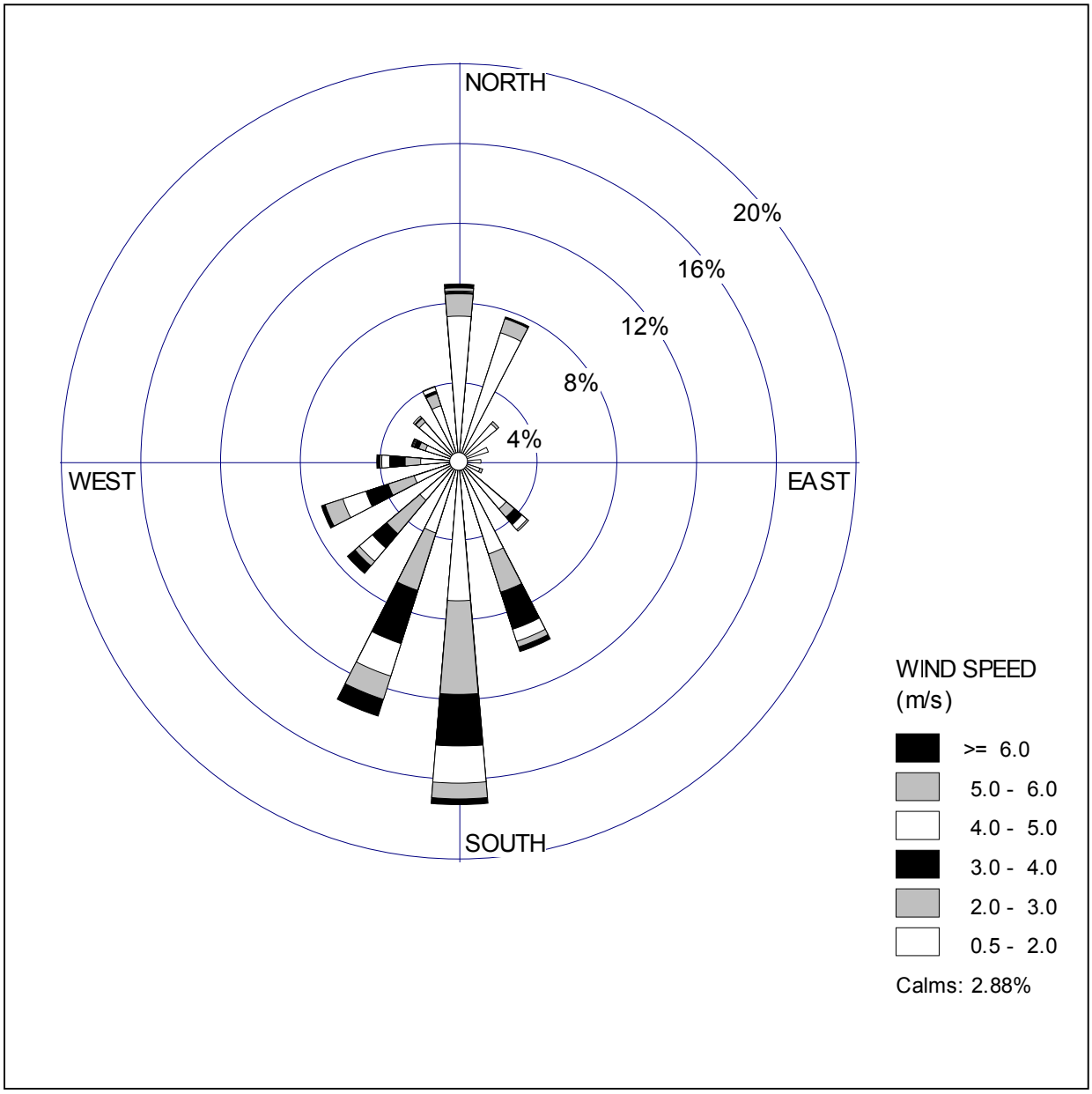


FIGURE 6 – METEOROLOGICAL SUMMARY FOR WARM SPRINGS SITE

5.3 Meteorological Conditions and Particulate Concentrations

Additional wind roses were generated for both monitoring sites to depict wind patterns during periods of elevated particulate concentrations – with the Opportunity site shown in Figure 7 and the Warm Springs site shown in Figure 8. For this analysis, "elevated" was defined as TSP concentrations greater than 28 $\mu g/m^3$ at Opportunity, and PM10 concentrations of greater than 18 $\mu g/m^3$ at Warm Springs. These thresholds – corresponding to roughly the 95^{th} percentile at both sites– were used to ensure that a sufficient volume of data was incorporated to produce meaningful wind rose results.

When comparing the wind roses for the Opportunity site (Figures 5 and 7), it is evident that wind speeds were often higher during elevated TSP conditions. This is reasonable, since the larger – and therefore heavier – particulates collected by a TSP monitor would require greater wind activity to be entrained into the air. The wind direction distribution during elevated TSP periods was also notably different from the overall pattern, with northerly and north-northeasterly winds being much more pronounced than at other times.

The corresponding wind roses for the Warm Springs site (Figures 6 and 8) show both higher and lower higher wind speeds during elevated PM10 periods. Many of the elevated PM10 episodes were associated with very light north-northeasterly winds.

The results for Opportunity suggest an influence from the Opportunity tailings area during strong northerly winds. However, the prevalence of light north-northeasterly winds at Warm Springs during elevated PM10 periods indicates the tailings area is likely not a factor.

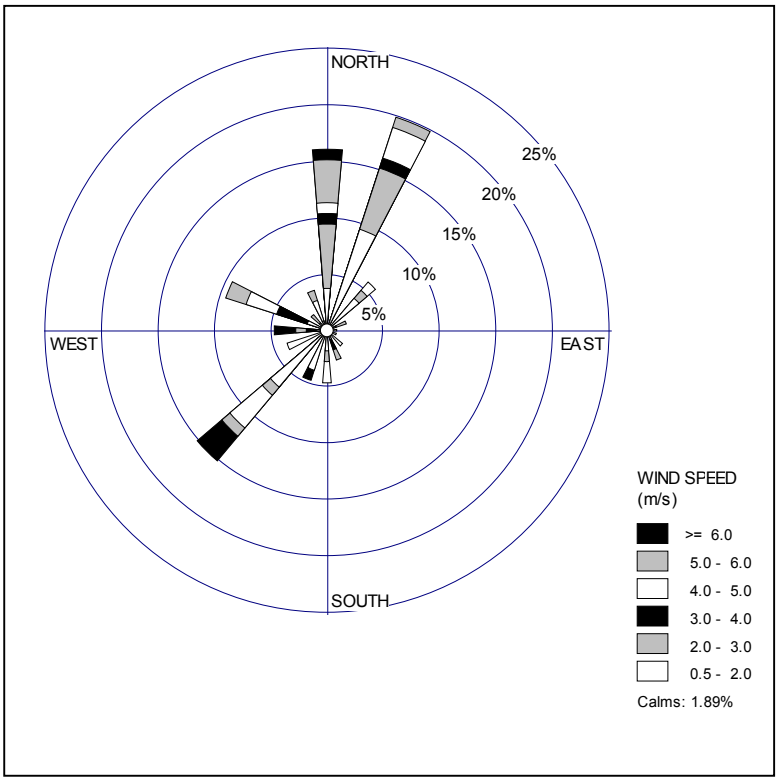


FIGURE 7 – OPPORTUNITY WIND ROSE FOR ELEVATED TSP PERIODS

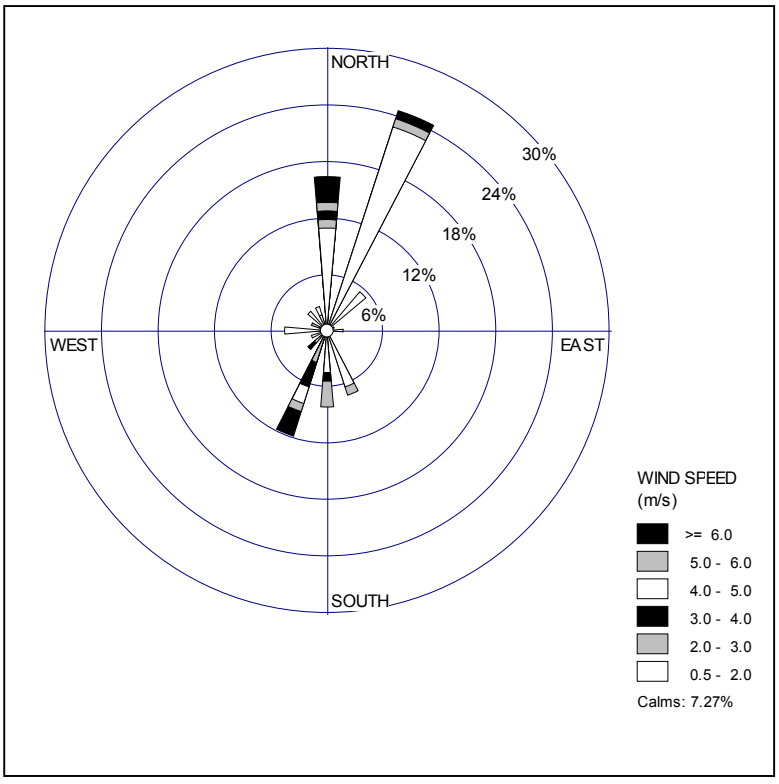


FIGURE 8 – WARM SPRINGS WIND ROSE FOR ELEVATED PM10 PERIODS

6.0 DATA QUALITY SUMMARY

Data quality is an integral part of any ambient monitoring program. The data collected must be of a known quality to be used for evaluation of local air quality and meteorological characteristics. This is particularly important when an objective of a monitoring program is to identify possible emission sources, and meteorological events associated with certain ambient air quality conditions – in this case, elevated PM10 or TSP levels.

The Opportunity and Warm Springs monitoring systems were checked and/or calibrated (as appropriate for each monitoring parameter) monthly during the first quarter of 2009. This was accomplished via performance checks using standards that were either:

- Traceable to NIST; or
- Otherwise certified by the test equipment manufacturer.

Each instrument response was recorded, and evaluated to determine whether it fell within its respective acceptance range. In the event that a response fell outside (or near the limits of) the applicable acceptance range, the monitor or sensor in question was adjusted or recalibrated as appropriate. Such results then must be evaluated, in conjunction with a detailed data review, to identify data periods that must be flagged or invalidated.

Minor sampler maintenance was also performed on a monthly basis. Additionally, data were reviewed frequently via satellite link, and inspected for any suspicious behavior requiring investigation.

6.1 Summary of Performance Check / Maintenance Activities

Performance checks and minor maintenance were conducted on a monthly basis. Table 3 summarizes checks and maintenance for the E-BAM sampler itself, while Table 4 lists the meteorological checks. Information presented includes:

- The instrument model and serial number for each component of the monitoring system;
- Each type of check/maintenance performed on that component;
- Performance acceptance ranges; and
- A description of the calibration standard (and its traceability) used to perform each check.

6.2 Data Quality Issues

In general, performance checks and maintenance activities conducted throughout the first quarter of 2009 indicted that the E-BAM samplers were meeting performance objectives. The performance check procedures and routine maintenance activities are discussed in detail in Appendix C. Results for the first quarter of 2009 are presented in Appendix D. All E-BAM sampler test results obtained during the first quarter of 2009 were satisfactory.

Additionally, in March both samplers' meteorological systems were recalibrated, and recommended annual maintenance was performed. Results of the calibrations are presented at the end of Appendix D.

Causes of data losses during the first quarter included the following:

- A total of 19 hours of TSP data at Opportunity, and 17 hours of PM10 data at Warm Springs, were excluded from analysis because it is suspected that moisture from snow events may have contributed to false elevated particulate readings.
- The E-BAM system recalibration and maintenance activities noted above resulted in the loss of 26 hours of data at Opportunity, and 46 hours at Warm Springs (the samplers were taken offsite).
- A total of 32 hours of wind data at Opportunity, and 58 hours at Warm Springs, were invalidated because of suspected icing of the wind instruments.
- Minor (5 hours or less) data losses occurred at both sites due to brief power outages.
- Additional minor data losses occurred at both sites due to routine maintenance.

TABLE 3 – SUMMARY OF PERFORMANCE CHECKS E-BAM SAMPLER

Met One E-BAM PM_{10} and TSP Samplers

Instrument	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Particulate Sampler	E-BAM	F7290 (TSP)	F7289 (PM_{10})	Leak Check	<1.5 LPM	BX-302 valve	N/A
				Operating Flow	+/- 2% (+/- 0.33 LPM)	Delta Cal S/N 000498	MFR/NIST
				Pump Test	(1)	BX-302 valve	N/A
				Zero/Span	Pass / Fail	Membrane Plates	MFR
				Clean Vane & Nozzle	(2)	N/A	N/A
				Clean PM10 Head	N/A	N/A	N/A
Barometer (3)	E-BAM	F7290	F7289	Collocated	+/- 2 mmHg	Aneroid Barometer	Mercury Barometer

Explanatory Notes for Table 3

N/A = Not applicable
MFR/NIST = Certified traceable to NIST by the manufacturer
MFR = Certified accurate per Met One's E-BAM-6100 Final Test Procedure
(1) Acceptance range varies with test flow rate, see Appendix C for discussion.
(2) Leak check performed following cleaning, result must be <1.5 LPM.
(3) Barometer is internal to E-BAM sampler.

TABLE 4 – SUMMARY OF PERFORMANCE CHECKS METEOROLOGICAL INSTRUMENTS

Met One Meteorological Instruments

Instrument (1)	Model	Serial No.		Check Description			
		OPP	*WS*	*Check Description*	*Acceptance Range*	*Check/Cal. Standard*	*Traceability*
Temperature	9250	F9487	F9481	Collocated	+/- 0.5 °C	Assmann Psychrometer	NIST
Relative Humidity	593	F9346	F9349	Collocated	+/- 5% Relative Humidity	Assmann Psychrometer	NIST
Wind Speed	0348	G2181	G2187	Collocated	+/- 0.5 m/s	Met One 010 Sensor	NIST
				Rotation Check	+/- 0.2 m/s	Synchronous Motor	MFR
Wind Direction	0348	G2181	G2187	Initial Alignment	+/- 2 degrees	Solar Sighting	NIST Time
				Linearity	+/- 3 degrees	Visual Crossarm Alignment (2)	N/A

Explanatory Notes for Table 4

(1) All meteorological instruments include certificate of NIST traceability from Met One, valid for a period of one year.
(2) Linearity checked by visually aligning wind vane in 90-degree increments with respect to crossarm.

MFR = Motor rotation rate provided by manufacturer.

7.0 AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES

Invalid hours for the quarter are summarized in Table 5 for the Opportunity site, and Table 6 for the Warm Springs site. The complete PM10 and TSP data sets for the quarter, and current qualifier codes are presented in Appendix E.

TABLE 5 – OPPORTUNITY SITE INVALID DATA PERIODS QUARTER 1, 2009

Part A – TSP

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-1-2009	1700		Tape change	BA
1-2-2009		0000	Tape change	BA
1-2-2009	1200, 1500, 1600, 1700	1900, 2200, 2300	Power outage	AV
1-3-2009		0000	Power outage	AV
1-16-2009	1500	2200	Monthly checks	BA
1-23-2009	1500	2200	Adjust tape	BA
1-26-2009	1700		Adjust tape	BA
1-27-2009		0000	Adjust tape	BA
2-2-2009	1300	2000	Tape change	BA
2-20-2009	1700		Monthly checks	BA
2-21-2009		0000	Monthly checks	BA
2-26-2009	1300-1700	2000-2300	Suspect snow effects	AM
2-27-2009		0000	Suspect snow effects	AM
3-2-2009	1700		Tape change	BA
3-3-2009		0000	Tape change	BA
3-12-2009	1200-2300	1900-2300	Maintenance / Cals.	BA
3-13-2009	0000-1300	0000-2000	Maintenance / Cals.	BA
3-16-2009	0900-1200	1600-1900	Suspect snow effects	AM
3-29-2009	1200-2100	1900-2300	Suspect snow effects	AM
3-30-2009		0000-0004	Suspect snow effects	AM
3-31-2009	0900	1600	Power outage	AV

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-2-2009	1200, 1500, 1600	1900, 2200, 2300	Power outage	AV
1-16-2009	1400	2100	Monthly checks	BA
2-20-2009	1700		Monthly checks	BA
2-21-2009		0000	Monthly checks	BA
3-12-2009	1200-2300	1900-2300	Maintenance / Cals.	BA
3-13-2009	0000-1300	0000-2000	Maintenance / Cals.	BA
3-16-2009	1900-2300		Instrument icing	AO
3-17-2009	0000-1000	0200-1700	Instrument icing	AO
3-29-2009	0100-1600	0800-2300	Instrument icing	AO
3-31-2009	0900	1600	Power outage	AV

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-2-2009	1200, 1500, 1600	1900, 2200, 2300	Power outage	AV
3-12-2009	1200-2300	1900-2300	Maintenance / Cals.	BA
3-13-2009	0000-1300	0000-2000	Maintenance / Cals.	BA
3-31-2009	0900	1600	Power outage	AV

TABLE 6 – WARM SPRINGS SITE INVALID DATA PERIODS QUARTER 1, 2009

Part A – PM10

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-1-2009	1600	2300	Tape change	BA
1-2-2009	1200-1500	1900-2200	Power outage	AV
1-16-2009	1300	2000	Monthly checks	BA
1-22-2009	2000		Suspect snow effects	AM
1-23-2009		0300	Suspect snow effects	AM
1-24-2009	2100-2300		Suspect snow effects	AM
1-25-2009	0000-0100	0400-0800	Suspect snow effects	AM
2-2-2009	1200	1900	Tape change	BA
2-11-2009	1100	1800	Sampler flow rate out of limits	AH
2-12-2009	1300, 1400	2000, 2100	Pump change	BA
2-20-2009	1600	2300	Monthly checks	BA
2-26-2009	1600-2000	2300	Suspect snow effects	AM
2-27-2009		0000-0300	Suspect snow effects	AM
3-2-2009	1400	2100	Tape change	BA
3-9-2009	1500-2300	2200-2300	Maintenance / Cals.	BA
3-10-2009	0000-2300	0000-2300	Maintenance / Cals.	BA
3-11-2009	0000-1200	0000-1900	Maintenance / Cals.	BA
3-22-2009	1100	1800	Adjusted temperature	BA
3-29-2009	0100	0800	Suspect snow effects	AM
3-29-2009	1400-1800	2100-2300	Suspect snow effects	AM
3-30-2009		0000-0100	Suspect snow effects	AM

Part B – Wind Direction / Wind Speed

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-2-2009	1200-1400	1900-2100	Power outage	AV
1-2-2009	1700-2300		Suspect icing	AO (1)
1-3-2009	0000-2300	0000-2300	Suspect icing	AO (1)
1-4-2009	0000-0300	0000-1000	Suspect icing	AO (1)
1-16-2009	1400	2100	Monthly checks	BA
2-12-2009	1300, 1400	2000, 2100	Pump change	BA
2-20-2009	1600, 1700	2300	Monthly checks	BA
2-21-2009		0000	Monthly checks	BA
3-9-2009	1500-2300	2200-2300	Maintenance / Cals.	BA
3-10-2009	0000-2300	0000-2300	Maintenance / Cals.	BA
3-11-2009	0000-1200	0000-1900	Maintenance / Cals.	BA
3-22-2009	2300		Instrument icing	AO
3-23-2009	0000-1000	0600-1700	Instrument icing	AO
3-28-2009	2300		Instrument icing	AO
3-29-2009	0000-1000	0600-1600	Instrument icing	AO
(1) Problem appeared to affect wind speed only.				

Part C – Temperature / Relative Humidity

Date	Invalid Hours (ending at) MST	Invalid Hours GMT	Reason	Data Invalidation Code
1-2-2009	1200-1400	1900-2100	Power outage	AV
2-12-2009	1300, 1400	2000, 2100	Pump change	BA
3-9-2009	1500-2300	2200-2300	Maintenance / Cals.	BA
3-10-2009	0000-2300	0000-2300	Maintenance / Cals.	BA
3-11-2009	0000-1200	0000-1900	Maintenance / Cals.	BA

8.0 REFERENCES

EPA. August 1998. EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Part 1, Ambient Air Quality Monitoring Program Quality System Development. EPA-45a/R-98-004.

APPENDIX A

MONTHLY DATA SUMMARIES
FIRST QUARTER 2009

OPPORTUNITY DAILY DATA SUMMARY - JANUARY 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	1	34	1.9	3.4	212	-2.1	2.8	-7.4	72
2	5	25	3.1	6.6	265	-0.2	3.9	-7.1	71
3	0	17	2.3	3.8	268	-11.0	-7.4	-16.1	48
4	0	16	2.7	5.5	177	-12.0	-6.4	-18.3	51
5	9	69	3.7	5.4	218	-3.1	0.5	-7.4	59
6	0 (9)	5	2.7	5.0	245	1.1	3.8	-0.3	64
7	0 (9)	4	3.8	6.1	233	5.1	5.9	4.3	70
8	0	19	3.9	5.8	238	4.1	6.0	1.0	67
9	0	9	3.4	5.0	262	0.7	2.4	-1.3	56
10	1	9	4.1	5.9	247	1.2	2.7	-0.5	57
11	0	7	2.5	4.3	278	3.1	6.4	-0.3	63
12	2	21	2.5	4.2	302	2.6	4.6	-1.5	61
13	4	50	4.1	7.4	283	5.6	7.3	4.6	43
14	7	34	1.9	3.6	359	2.7	5.1	-0.9	58
15	13	58	1.2	2.6	237	1.4	6.9	-3.5	72
16	6	20	1.6	2.8	193	-0.3	5.3	-4.5	69
17	9	42	1.1	2.4	177	-3.2	4.8	-8.8	70
18	14	53	0.9	1.9	210	-5.4	2.9	-10.8	73
19	27	119	0.7	1.4	263	-6.4	2.4	-12.2	74
20	24	67	1.2	2.0	259	-5.1	3.2	-12.4	66
21	24	46	1.2	2.5	61	-3.5	4.0	-10.3	64
22	21	115	1.8	3.4	64	-0.4	4.1	-7.3	64
23	19	32	1.5	3.4	15	-12.4	-9.0	-15.1	72
24	20	51	1.4	2.5	9	-11.9	-7.9	-16.5	75
25	10	27	1.6	2.8	8	-18.8	-14.9	-24.8	65
26	6	29	1.1	3.0	180	-21.7	-13.2	-27.8	56
27	14	81	3.6	6.6	205	-11.6	-2.6	-22.7	56
28	9	29	3.1	4.5	289	-1.9	0.0	-3.3	63
29	8	125	3.0	5.1	277	-0.3	3.9	-3.1	58
30	2	11	2.4	3.9	200	2.1	7.9	-2.7	51
31	10	40	5.2	8.5	251	1.4	3.9	-4.2	40

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(9) Negative value detected, zero reported

OPPORTUNITY DAILY DATA SUMMARY - FEBRUARY 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	3	16	3.0	6.3	246	-3.0	1.3	-7.5	45
2	6	24	3.1	5.6	244	2.2	7.6	-0.1	60
3	4	13	2.4	5.1	183	4.4	10.7	0.2	58
4	5	13	3.1	4.6	182	4.4	11.4	-0.4	44
5	6	21	2.6	3.5	172	4.2	9.5	0.9	46
6	2	13	2.7	4.6	229	2.8	5.5	1.2	54
7	6	30	1.4	3.4	285	-0.2	6.2	-5.3	72
8	6	22	1.4	2.6	194	-2.7	5.7	-8.9	66
9	11	26	1.6	3.3	26	-1.8	3.4	-5.6	68
10	2	11	2.2	3.8	281	-3.8	-0.1	-7.6	51
11	3	16	1.7	3.4	215	-5.0	0.3	-9.8	61
12	7	27	1.4	2.4	172	-4.6	0.5	-8.9	63
13	8	20	2.0	4.0	158	-5.9	1.6	-11.9	61
14	9	33	1.4	2.8	152	-6.7	-0.6	-12.0	67
15	3	12	2.6	3.8	179	-3.0	2.4	-7.7	60
16	5	22	2.4	3.6	163	1.1	7.3	-2.5	49
17	10	23	1.5	3.1	342	-0.1	4.7	-6.8	61
18	5	23	2.4	5.0	275	1.4	3.9	-1.3	59
19	2	15	3.3	5.7	232	2.0	5.7	-3.2	50
20	13	114	2.5	5.7	357	0.3	4.0	-7.0	51
21	9	24	1.9	3.7	190	-0.6	9.6	-6.8	53
22	7	14	2.1	4.3	181	3.7	12.4	-4.4	46
23	6	38	2.9	5.4	206	6.9	11.9	3.6	52
24	2	10	2.4	4.8	223	3.1	6.7	-1.7	72
25	2	22	2.4	3.9	216	3.0	7.1	-0.5	58
26	2	15	2.3	3.6	293	-1.1	3.7	-6.4	69
27	3	20	2.9	5.1	275	-6.1	-1.0	-11.8	61
28	7	22	1.6	2.6	188	-5.0	0.4	-11.4	63

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

OPPORTUNITY DAILY DATA SUMMARY - MARCH 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	4	22	2.0	3.9	201	4.6	13.2	-4.3	45
2	12	93	2.9	5.1	169	8.1	15.7	2.3	44
3	5	47	2.0	4.6	209	3.7	9.5	-0.6	72
4	4	13	1.9	3.6	238	0.2	2.7	-2.4	72
5	8	63	2.8	5.9	217	-0.9	1.0	-3.6	65
6	11	64	1.9	4.0	11	-8.4	-3.3	-13.9	73
7	7	122	4.1	7.9	220	-2.9	2.9	-9.1	55
8	8	67	2.8	4.6	296	-6.4	-1.8	-13.5	60
9	12	65	2.2	3.3	100	-10.7	-4.1	-15.1	59
10	12	82	3.3	5.2	225	-8.8	-4.2	-12.7	50
11	7	28	2.1	4.9	28	-8.6	-1.2	-16.7	54
12	8	19	0.9	1.5	166	-11.9	-3.8	-15.0	66
13	8	28	3.5	5.5	226	5.9	9.1	2.5	27
14	9	71	2.7	4.8	210	4.6	10.6	0.5	34
15	6	35	3.2	6.6	225	3.7	7.9	0.1	58
16	4	23	1.9	4.6	338	-1.3	0.4	-3.9	86
17	7	27	1.8	4.2	310	-2.7	1.9	-9.4	70
18	10	23	1.2	3.0	41	-1.6	4.3	-8.0	66
19	12	28	1.7	3.1	214	2.1	10.1	-8.8	66
20	8	25	1.7	4.0	205	5.0	12.4	-3.1	59
21	7	19	2.0	4.8	184	5.2	12.8	1.4	69
22	5	66	2.0	4.0	334	3.1	6.6	-1.4	78
23	6	30	2.3	4.5	354	-0.3	3.1	-2.9	76
24	3	41	1.9	3.9	287	-1.2	4.1	-6.5	68
25	11	72	4.1	6.5	317	-2.4	2.2	-10.2	65
26	6	16	1.9	3.4	358	-8.3	-2.7	-12.7	58
27	16	235	2.7	5.2	254	-1.2	6.5	-9.8	51
28	2	20	2.0	3.5	256	2.8	5.5	0.0	65
29	7	24	4.6	6.8	353	-2.6	0.2	-7.0	86
30	10	29	1.6	3.2	284	-5.2	-0.9	-12.2	69
31	3	16	2.7	4.7	252	-1.2	3.0	-4.9	64

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

WARM SPRINGS DAILY DATA SUMMARY - JANUARY 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	0 (9)	10	2.3	4.2	181	-1.9	3.3	-6.8	72
2	0 (9)	10	2.7	5.1	206	-0.4	3.7	-7.4	71
3	0 (9)	7	NO DATA	NO DATA	NO DATA	-10.6	-7.2	-15.5	51
4	0 (9)	14	3.9	5.5	175	-11.0	-5.7	-17.0	50
5	0 (9)	16	4.7	7.3	181	-2.6	0.7	-5.7	57
6	0 (9)	7	3.1	5.4	205	1.5	4.5	-0.1	62
7	0 (9)	10	3.0	4.9	188	5.0	5.9	4.5	70
8	0 (9)	8	4.7	7.2	204	3.9	5.6	1.4	68
9	0	12	2.9	5.9	244	0.7	2.9	-1.3	56
10	0 (9)	10	3.2	5.2	225	1.4	3.4	-1.1	54
11	0	12	2.2	5.9	277	2.8	6.7	-0.9	63
12	0	8	2.5	5.3	270	2.3	4.8	-1.5	61
13	1	10	4.4	7.3	240	5.2	7.5	1.1	45
14	1	9	0.9	2.0	15	1.5	5.5	-3.0	64
15	1	14	0.9	2.2	166	1.0	6.9	-5.1	74
16	4	17	1.1	1.7	243	-1.4	5.4	-6.6	74
17	5	16	1.0	2.1	182	-3.2	5.2	-8.6	70
18	8	33	0.7	1.5	65	-5.7	3.3	-10.9	74
19	8	25	0.6	1.1	21	-6.8	2.8	-12.7	73
20	14	38	0.7	1.2	14	-7.1	4.0	-13.3	72
21	13	37	0.8	1.7	4	-5.5	4.3	-11.5	71
22	9	23	1.2	2.6	9	-2.7	3.4	-7.7	73
23	10	28	1.0	1.9	17	-12.7	-8.7	-15.0	69
24	13	26	1.0	1.6	12	-12.2	-7.5	-16.7	74
25	11	49	1.3	2.5	17	-18.1	-13.8	-23.4	62
26	1	19	0.9	1.7	162	-21.3	-12.9	-26.2	56
27	12	94	2.2	5.5	192	-12.9	-1.5	-26.0	60
28	0	17	2.4	4.1	245	-1.9	1.1	-5.3	62
29	0 (9)	13	2.6	5.8	253	-1.0	3.4	-4.7	60
30	3	28	3.1	5.5	178	0.3	7.8	-8.4	57
31	12	120	5.6	8.5	248	1.8	4.7	-3.6	38

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(9) Negative value detected, zero reported

WARM SPRINGS DAILY DATA SUMMARY - FEBRUARY 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	1	16	2.5	5.3	226	-2.8	1.5	-7.6	45
2	2	16	2.1	4.0	222	1.2	6.3	-2.6	61
3	1	20	1.8	3.1	176	3.6	11.0	-4.0	59
4	1	13	2.9	4.9	184	5.1	11.4	1.3	40
5	2	12	3.0	5.2	162	4.9	9.2	1.5	43
6	2	13	2.7	4.8	207	2.8	6.6	0.6	53
7	2	17	1.2	2.4	55	-0.2	5.8	-5.5	73
8	3	27	1.4	3.4	187	-3.0	4.9	-8.9	68
9	5	19	1.0	1.8	29	-2.3	3.9	-6.8	69
10	0	19	1.1	2.2	26	-4.3	0.5	-8.5	56
11	2	19	1.5	3.9	206	-5.0	0.9	-9.9	62
12	2	18	1.6	2.6	177	-4.9	1.1	-9.1	67
13	1	22	1.4	3.2	158	-5.8	2.9	-11.7	62
14	3	21	0.8	1.4	52	-7.5	-0.8	-12.6	70
15	0	19	2.6	4.0	176	-3.2	2.3	-11.0	59
16	0	14	2.7	3.9	161	1.7	7.3	-1.2	46
17	3	14	0.9	2.0	14	-0.8	4.9	-7.8	65
18	1	11	2.2	4.0	261	1.3	4.6	-1.5	61
19	0	5	2.8	5.1	210	2.1	6.4	-2.0	48
20	4	28	1.9	3.0	304	0.5	4.7	-6.1	52
21	3	16	1.7	3.9	173	-1.2	10.1	-9.8	56
22	3	14	2.1	4.0	165	2.7	12.1	-8.9	49
23	2	21	3.9	5.6	188	7.2	11.4	4.0	49
24	2	22	2.6	6.1	202	3.2	7.1	-1.8	71
25	0	12	2.8	5.2	190	3.1	6.8	-0.7	58
26	4	24	2.1	4.1	134	-1.4	3.5	-6.8	72
27	0 (9)	5	1.3	3.3	76	-6.5	-1.2	-11.3	68
28	5	19	0.8	1.7	358	-7.6	0.7	-16.6	69

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds
(9) Negative value detected, zero reported

WARM SPRINGS DAILY DATA SUMMARY - MARCH 2009

(Midnight to Midnight, Mountain Standard Time)

Day	(a) Average Concentration (ug/m3)	(a) Maximum Concentration (ug/m3)	Average Wind Speed (m/s)	Maximum Wind Speed (m/s)	Resultant Wind Direction (degrees) (b)	Average Temperature (deg C)	Maximum Temperature (deg C)	Minnimum Temperature (deg C)	Average Relative Humidity (percent)
1	4	30	1.9	3.9	181	3.2	12.5	-5.9	53
2	2	13	3.3	5.9	173	7.5	14.0	0.4	45
3	4	29	2.3	5.0	170	3.9	10.1	-0.7	71
4	2	18	1.4	2.8	246	0.2	3.2	-2.5	72
5	5	37	3.4	6.5	188	-0.7	1.6	-2.8	66
6	6	40	1.5	2.2	17	-8.0	-2.1	-13.7	70
7	1	14	3.2	6.2	197	-3.2	4.1	-11.5	58
8	1	23	2.3	5.1	271	-6.4	-1.9	-13.3	57
9	3	8	1.3	2.0	3	-12.3	-5.0	-15.0	57
10	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
11	4	25	1.6	2.4	12	-5.8	-1.0	-12.3	48
12	1	11	1.2	2.2	285	-7.2	2.5	-16.3	57
13	3	22	2.6	5.2	201	-0.1	10.9	-11.9	48
14	2	13	4.0	6.5	197	5.6	11.6	0.6	34
15	4	18	4.4	7.7	208	4.6	8.5	1.3	58
16	3	25	1.7	3.8	232	-0.5	1.2	-3.1	81
17	3	15	1.9	3.9	235	-1.3	3.7	-7.7	64
18	5	15	1.5	2.6	205	-1.0	4.9	-7.1	69
19	6	21	1.5	3.1	188	2.5	11.8	-6.7	69
20	5	17	2.1	4.6	198	6.4	14.8	-1.3	60
21	4	17	2.1	3.6	176	5.9	13.7	1.5	69
22	1	18	1.6	2.9	357	3.8	7.1	-1.8	75
23	4	22	1.4	2.1	44	-0.7	3.0	-5.2	76
24	3	19	1.4	2.9	288	-2.4	3.2	-8.8	73
25	2	53	2.8	5.7	318	-3.0	1.5	-11.0	64
26	3	16	1.6	2.6	337	-8.9	-2.6	-15.2	58
27	1	12	2.3	4.1	231	-1.8	6.6	-10.3	53
28	2	26	2.0	3.1	218	2.9	6.4	-0.2	64
29	6	27	4.1	6.5	357	-3.0	0.0	-8.0	86
30	4	16	1.7	4.3	268	-5.7	-0.7	-12.0	68
31	1	11	3.0	5.0	217	-1.5	3.3	-4.9	65

(a) Values are at Local temperature and pressure (LTP)
(b) Calculations are weighted with corresponding wind speeds

APPENDIX B

DUST SAMPLE MEMORANDA

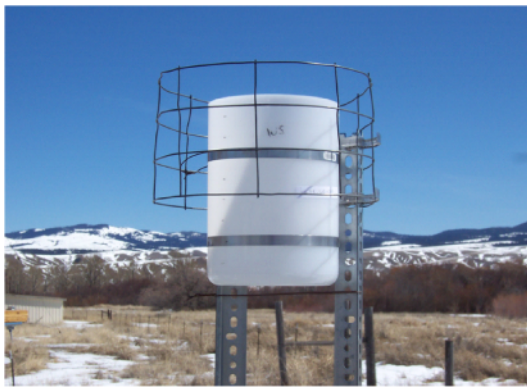
Blacktail Consulting, Inc.
Air Quality / Meteorology / Data Quality
P.O. Box 4692
Butte MT 59702
USA
Ph (406) 498-4199
sheck@rfwave.net

MEMORANDUM – Opportunity / Warm Springs Dustfall Sampling Event – Rev.2

Submitted by Steve Heck, Blacktail Consulting, Inc.

April 10, 2009

This memorandum describes the preliminary results of initial dustfall sampling conducted at the Opportunity and Warm Springs air monitoring sites on behalf of Kuipers and Associates, and Anaconda-Deer Lodge County. All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan. Analytical method development has continued, due to issues with isopropyl alcohol contamination described herein.



1. Sample Collection

On December 1, 2008, clean 6.75 inch diameter by 8.75 inch tall nalgene, polypropylene dustfall jars were installed at both sites at a height of approximately 8 feet to capture and retain settling dust. The jars were de-contaminated by the laboratory prior to use by cleaning them with laboratory soap, then rinsing them with nitric acid and deionized water. The jars were initially filled to a depth of 4 inches with a 50/50 mixture of deionized water (DI H_2O) and 99.5% pure, ACS grade isopropyl alcohol (propanol) to prevent freezing. The jars were inspected during twice-weekly site visits; DI H_2O and/or propanol were added as necessary to maintain a liquid level of at least an inch. At the end of the sampling period on January 6, 2009, the jars were covered with clean lids, and transported to the MSE laboratory for analysis. A field blank was also prepared by partially filling a clean jar with a 50/50 mixture of DI H_2O and propanol and leaving it covered it for the duration of the sampling event.

2. Analytical Procedures

After delivery to the laboratory, the dustfall jar contents were transferred into 2,000 mL beakers, which then were covered with watchglasses and evaporated in a convection oven at a

temperature of 90 to 105ºC. After the liquid evaporated down to approximately 100-200 mL, the contents were transferred to pre-weighed 300-mL beakers and evaporated to dryness. The beakers then were weighed to within 0.0001 grams to determine a net particulate residue weight. The residue was digested using SW-846 Method 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer (ICP-MS) using Method SW-846 6020A.

3. Raw Analytical Results

The raw analytical results – presented in Part A of Table 1 – show the trace element concentrations in the liquid as received by the laboratory, the volume of liquid initially evaporated, and the net weight of solids after evaporation.

Because of concerns with previous field blank results, 50-mL aliquots of both isopropyl alcohol and deionized water were obtained directly from their containers (laboratory blank), then evaporated and brought up to 50 mL for ICP-MS analysis. The results (Part A of Table 1) show that both arsenic and zinc were present in the alcohol, requiring a blank correction as discussed in Section 4.

4. Trace Element Results with Blank Correction

While the concentrations of arsenic and zinc are low with respect to alcohol volume, they are high enough to significantly affect the dustfall results because of the small amount of particulate collected, and the large amount of alcohol (6 liters) used in each dustfall bucket over the duration of the sampling period. To calculate the effect of these impurities on the submitted dustfall samples, one first must calculate amount of arsenic and zinc present. For the Field Blank, this is simple since that container was originally filled with one-half liter of alcohol; therefore 0.80 µg of arsenic and 0.62 µg of zinc were present. For the Opportunity and Warm Springs samples, a total of six liters of alcohol were added to each jar over the sample collection period (including initial setup); therefore, each sample collection jar contained 9.60 µg of arsenic and 7.44 µg of zinc.

An appropriate blank correction was made by 1) Calculating the mass of each trace element present in each submitted sample by multiplying the trace element concentration by the analyzed sample volume, then 2) Subtracting the arsenic and zinc mass contributions from the alcohol. Results are shown in Part B of Table 1.

5. Trace Element Concentrations in Dustfall Particulate

The trace element concentrations in the collected dust were calculated by dividing the blank-corrected trace element weights by the total amount of particulate collected in each sample. Results are shown in Part C of Table 1, along with the laboratory reporting limit for each analyte. Because of the improved evaporation and weighing procedure, the results for arsenic and lead are much more consistent with other data than were the previous dustfall samples (which had weighing resolution issues).

The ARCO South sampler located adjacent to the ADLC Opportunity site monitors PM-10 every third day; in addition, selected exposed filters are also analyzed for arsenic and zinc. Dividing a given trace element concentration in an exposed filter by the PM-10 concentration should provide an indication of that element's concentration in the particulate matter collected by the filter. This calculation was made for all ARCO South sampler results for 2008, and results are presented in Table 2. On a total mass basis, the average arsenic concentration during 2008 was 140 mg/kg, while the average lead concentration was 188 mg/kg. Corresponding values at Opportunity during the December 1, 2008 – January 6, 2009 sampling period were 128 mg/kg for arsenic, and 60.7 mg/kg for lead. The results are not directly comparable, because 1) The ARCO samplers monitor PM-10, rather than total particulate, 2) The ARCO averages represent many discrete 24-hour samples throughout the year (whereas the dustfall result represents a 36-day continuous sample), and 3) The dustfall buckets by definition only capture dust that actually settles out of the air. Despite these differences, the results show very good order-of-magnitude agreement.

6. Calculation of Total Dustfall Rate

Dustfall is expressed in units of g/m^2/month. With a diameter of 6.75 inches, the dustfall jars have a cross-sectional area of 35.78 in^2, or 0.0231 m^2. The Opportunity and Warm Springs samples had net particulate weights of 22.6 mg and 37.8 mg respectively, giving dustfall rates of 0.98 g/m^2 and 1.64 g/m^2 over the 36-day sample collection period. This equals 0.82 g/m^2/month at Opportunity, and 1.37 g/m^2/month at Warm Springs (based on a 30-day month). These values are quite low when compared to the Montana settleable particulate standard of 10 g/m^2/month.

7. Data Quality Issues and Recommendations for Future Sampling and Analysis

The results herein can be presented with greater confidence than those for previous dustfall samples, because the new evaporation and weighing procedure provides much better resolution – less than one mg, versus as much as 0.02-0.03 g (20-30 mg) previously.

The use of isopropyl alcohol still introduces uncertainty into the arsenic and zinc results, even when a blank correction is used. While all of the isopropyl alcohol used for this sampling originated from the same lot, there is no guarantee that the arsenic and zinc concentrations (1.60 µg/L and 1.24 µg/L, respectively) found in the 50 mL aliquot were uniform throughout the lot. It cannot even be stated with certainty that the distribution of those elements within a single bottle is uniform. Also, the levels of arsenic and zinc measured in the alcohol were less than five times the laboratory's corresponding method detection limits.

Other brands/grades of isopropyl alcohol could be evaluated for improved purity, though the brand that was used is considered a high grade. However, initial investigation has not identified an isopropyl alcohol source that will guarantee sufficiently low (e.g., 0.1 µg/L or less) trace element concentrations. A couple of purportedly ultra-pure – and very costly – brands only specify trace element concentrations at 10 ppb or less. Therefore, isopropyl alcohol will not be used for the remainder of the 2008-2009 winter season. The use of isopropyl alcohol may be considered for the 2009-2010 winter season, if a source of proven quality can be identified. The effect of freezing on the dustfall jars' particulate collection efficiency has not been

evaluated. To this end, duplicate dustfall jars were installed at Opportunity on January 6, 2009, and retrieved on March 2. One contained a mixture of DI water and alcohol, while the second jar contains DI water only – which will be allowed to freeze and thaw. Both jars have been submitted for analysis, and the total particulate and trace element results will be compared.

TABLE 1 -- SUMMARY OF OPPORTUNITY / WARM SPRINGS DUSTFALL RESULTS
(Sample collected from 12-1-2008 to 1-6-2009)

A. Analytical Results

Analyte	Opportunity (ug/L)	Warm Springs (ug/L)	Field Blank (ug/L)	Alcohol Blank (ug/L)	DI Water Blank (ug/L)
As	10.2	13.5	0.429	1.60	ND
Cd	0.168	0.109	0.063	ND	ND
Cu	8.35	13.9	0.082	ND	ND
Pb	1.12	1.45	0.008	ND	ND
Zn	13.9	21.4	0.266	1.24	ND
	Opportunity	**Warm Springs**	**Field Blank**	**Alcohol Blank**	**DI Water Blank**
Sample Volume (mL)	1225	1120	1440	50 mL	50 mL
Solids Weight (mg)	22.6	37.8	1.0	N/A	N/A
Solids (mg/L)	18.4	33.8	0.7	N/A	N/A
ND = Not Detected; NA = Not Applicable					

B. Trace Element Results With Blank Correction (total trace element mass)

Analyte	Opportunity Total (ug)	**Opportunity Net (ug)**	Warm Springs Total (ug)	**Warm Springs Net (ug)**	Field Blank Total (ug)	**Field Blank Net (ug)**
As	12.5	2.90	15.12	5.52	0.618	-0.182
Cd	0.206	0.206	0.122	0.122	0.091	0.091
Cu	10.2	10.2	15.6	15.6	0.118	0.118
Pb	1.37	1.37	1.62	1.62	0.012	0.012
Zn	17.0	9.59	24.0	16.5	0.383	-0.237
Volume of alcohol used for sample (L)	Opportunity 6.0		Warm Springs 6.0		Field Blank 0.5	

C. Trace Element Results With Blank Correction (trace element mass per particulate mass)

Analyte	Opportunity Total (mg/kg)	**Opportunity Net (mg/kg)**	Reporting Limit (mg/kg)	Warm Springs Total (mg/kg)	**Warm Springs Net (mg/kg)**	Reporting Limit (mg/kg)
As	553	**128**	3.32	400	**146**	1.98
Cd	9.11	**9.11**	0.221	3.23	**3.23**	0.132
Cu	453	**453**	2.77	412	**412**	1.65
Pb	60.7	**60.7**	0.442	43.0	**43.0**	0.265
Zn	753	**424**	6.64	634	**437**	3.97

TABLE 2 -- ARCO PM-10/TRACE ELEMENT RESULTS AT OPPORTUNITY - CALENDAR YEAR 2008

DATE	ARCO Pb (ug/m3 E-3)	ARCO As (ug/m3 E-3)	ARCO PM-10 (ug/m3)	Pb mg/kg	As mg/kg
1/19/2008	1.31	**0.15**	3	436.7	50.0
1/28/2008	1.28	1.28	4	320.0	320.0
2/6/2008	1.3	1.3	1	1300.0	1300.0
2/15/2008	**0.15**	**0.15**	2	75.0	75.0
2/21/2008	1.91	0.64	9	212.2	71.1
2/24/2008	**0.15**	**0.15**	3	50.0	50.0
3/4/2008	0.64	**0.15**	3	213.3	50.0
3/13/2008	1.93	**0.15**	3	643.3	50.0
3/22/2008	1.89	**0.15**	3	630.0	50.0
3/31/2008	1.93	1.28	5	386.0	256.0
4/9/2008	3.17	1.27	5	634.0	254.0
4/18/2008	3.81	1.9	8	476.3	237.5
4/27/2008	2.49	1.24	10	249.0	124.0
5/6/2008	1.94	1.29	9	215.6	143.3
5/15/2008	0.62	0.62	3	206.7	206.7
5/18/2008	1.28	0.64	11	116.4	58.2
5/24/2008	0.65	0.65	2	325.0	325.0
6/2/2008	1.25	1.87	6	208.3	311.7
6/11/2008	**0.15**	**0.15**	4	37.5	37.5
6/29/2008	1.26	1.26	12	105.0	105.0
7/8/2008	1.23	1.23	13	94.6	94.6
7/17/2008	1.2	1.2	14	85.7	85.7
7/26/2008	1.26	1.26	15	84.0	84.0
8/4/2008	0.61	1.82	8	76.3	227.5
8/13/2008	1.28	1.28	9	142.2	142.2
8/19/2008	1.9	2.53	31	61.3	81.6
8/22/2008	**0.15**	1.22	1	150.0	1220.0
8/31/2008	0.63	1.26	3	210.0	420.0
9/9/2008	2.43	2.43	8	303.8	303.8
9/18/2008	1.21	1.21	13	93.1	93.1
9/27/2008	1.21	1.21	8	151.3	151.3
10/6/2008	0.62	0.62	5	124.0	124.0
10/15/2008	0.61	0.61	6	101.7	101.7
10/24/2008	1.25	0.62	7	178.6	88.6
10/27/2008	3.04	1.82	14	217.1	130.0
11/2/2008	1.21	1.82	4	302.5	455.0
11/11/2008	0.62	**0.15**	4	155.0	37.5
11/20/2008	1.23	**0.15**	5	246.0	30.0
11/29/2008	**0.15**	**0.15**	2	75.0	75.0
12/8/2008	0.63	0.63	4	157.5	157.5
12/17/2008	1.96	**0.15**	3	653.3	50.0
12/26/2008	**0.15**	**0.15**	2	75.0	75.0
Sum of weights	53.69	39.810	285.00		
AVG mg/kg	**188**	**140**		**252**	**198**
	(Total weight basis)			**(Average of daily mg/kg)**	

Days with PM-10 result of zero were excluded
A value of 0.15 denotes non-detect; representing 1/2 of detection limit of 0.30

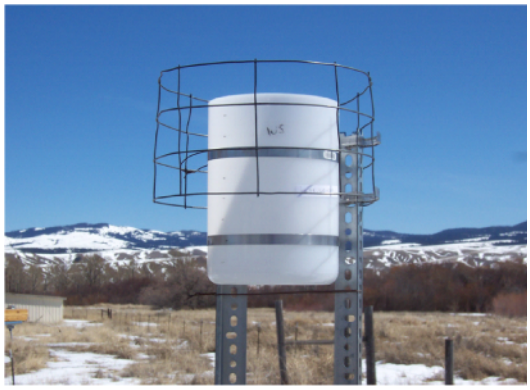
Blacktail Consulting, Inc.
Air Quality / Meteorology / Data Quality
P.O. Box 4692
Butte MT 59702
USA
Ph (406) 498-4199
sheck@rfwave.net

MEMORANDUM – Opportunity / Warm Springs Dustfall Sampling Event
January 6, 2009 through March 2, 2009 – Rev 1

Submitted by Steve Heck, Blacktail Consulting, Inc.

September 1, 2009

This memorandum describes the preliminary results of initial dustfall sampling conducted at the Opportunity and Warm Springs air monitoring sites on behalf of Kuipers and Associates, and Anaconda-Deer Lodge County. All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan. Analytical method development has continued, due to issues with isopropyl alcohol contamination described herein.



1. Sample Collection

On January 6, 2009, clean 6.75 inch diameter by 8.75 inch tall Nalgene, polypropylene dustfall jars were installed at both sites at a height of approximately 8 feet to capture and retain settling dust. The jars were de-contaminated by the laboratory prior to use by cleaning them with laboratory soap, then rinsing them with nitric acid and deionized water. The jars were initially filled to a depth of 4 inches with a 50/50 mixture of deionized water (DI H_2O) and 99.5% pure, Amercian Chemical Society (ACS) grade isopropyl alcohol (propanol) to prevent freezing. Additionally, because of concerns with trace element contamination introduced by propanol, a second jar at the Opportunity site was filled with DI H_2O only. The jars were inspected during twice-weekly site visits; DI H_2O and/or propanol were added as necessary to maintain a liquid level of at least an inch. At the end of the sampling period on March 2, 2009, the jars were covered with clean lids, and transported to the MSE laboratory for analysis. A field blank was also prepared by partially filling a clean jar with DI H_2O.

2. Analytical Procedures

After delivery to the laboratory, the dustfall jar contents were transferred into 2,000 mL beakers, which then were covered with watchglasses and evaporated in a convection oven at a temperature of 90 to 105ºC. After the liquid evaporated down to approximately 100-200 mL, the contents were transferred to pre-weighed 200-mL beakers and evaporated to dryness. The beakers then were weighed to within 0.0001 grams to determine a net particulate residue weight. The residue was digested using SW-846 Method 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer (ICP-MS) using Method SW-846 6020A.

3. Raw Analytical Results

The raw analytical results – presented in Part A of Table 1 – show the trace element concentrations in the liquid as received by the laboratory, the volume of liquid initially evaporated, and the net weight of solids after evaporation. The influence of propanol on the analytical results is obvious, particularly for arsenic, and to a lesser extent copper and lead.

A 50-mL aliquot of propanol was obtained directly from its container, then evaporated and brought up to 50 mL for ICP-MS analysis. The results (Part A of Table 1) show significant trace element levels in the propanol, requiring a blank correction as discussed in Section 4.

The total trace element mass in each sample was calculated by multiplying the concentration in the sample liquid by the volume of liquid as received by the laboratory. Those results are shown in Part B of Table 1.

4. Trace Element Results with Blank Correction

While the propanol's trace element concentrations are relatively low, they significantly affect the dustfall results because of the small amount of particulate (roughly 10 mg), and the large amount of propanol (9 liters) used in each dustfall bucket over the duration of the sampling period. To calculate the effect of these impurities on the submitted dustfall samples, one first must calculate the amounts of trace elements introduced to the samples. For example, a total of nine liters of propanol were added to each jar over the sample collection period (including initial setup); therefore, each sample collection jar contained 21.3 µg of arsenic and 117 µg of zinc.

Appropriate blank corrections must be made by subtracting the trace element mass contributions by the propanol. Results are shown in Part C of Table 1. Unfortunately, the net results for most trace elements were negative. This is likely due to uncertainty in the trace element concentrations within the propanol itself. In addition to the propanol analysis performed in conjunction with this sample submittal, an aliquot of propanol was analyzed for trace elements in the fall of 2008. There is some variance between the two sets of analytical results, as shown below:

Analyte	Current Propanol Screen (µg/L)	Previous Propanol Screen (µg/L)	Reporting Limit (µg/L)
As	2.31	1.60	3.00
Cd	0.381	ND	0.200
Cu	2.14	ND	2.50
Pb	0.516	ND	0.400
Zn	13.0	1.24	6.00

Although the two aliquots were obtained from different propanol bottles received several months apart, both were from the same manufacturer's lot number. In all cases, the differences between the two results were less than twice the analytes' reporting limits. However, even small differences in the assumed trace element levels have drastic effects on the calculated trace element concentrations in the dustfall particulate.

Arsenic is a good case in point. As discussed previously, when an arsenic (in propanol) concentration of 2.31 µg is used for the blank correction, a net mass of –6.99 µg is obtained for the Opportunity sample, and –1.00 µg for the Warm Springs sample. However, using the arsenic concentration of 1.60 µg obtained from the first analysis gives a result of –0.06 µg for Opportunity and 5.93 µg for Warm Springs. I.e., changing the assumed arsenic concentration in the propanol by only 0.71 µg/L (less than one-fourth of the arsenic reporting limit) changes the calculated arsenic mass in the dustfall particulate by roughly 7 µg.

Because of the trace element contamination issue, the use of propanol in dustfall jars was discontinued beginning with the samples started on March 2, 2009. The large amount of propanol (9 liters for the samples discussed herein) required to prevent freezing over the sampling period coupled with the small amount of particulate captured by the jars exacerbates any analytical uncertainties. Also, there is no assurance that the trace element concentrations from different propanol bottles – or even within a single bottle – are uniform.

5. Trace Element Concentrations in Dustfall Particulate

The trace element concentrations in the collected particulate were calculated by dividing the blank-corrected trace element weights by the total amount of particulate collected in each sample. Results are shown in Part D of Table 1. The results for the Opportunity sample in which ***only*** DI H_2O was used (highlighted) were 214 mg/kg for arsenic, and 154 mg/kg for lead. These values are of the same magnitude as for previous glass dish dust samples, and for values calculated from ARCO's South sampler trace element results.

Because of problems introduced by trace elements in the propanol, meaningful results for the other two dustfall jars cannot be calculated.

6. Calculation of Total Dustfall Rate

Dustfall is normally expressed in units of g/m^2/month, and is calculated by dividing the mass of particulate collected by the cross-sectional area of the dustfall jar, and dividing that result by the number of days the sample was collected over. At Opportunity, the total particulate mass collected was 9.1 mg for the jar containing propanol, but only 4.4 mg for the jar containing only DI H_2O. The discrepancy may be due to small amounts of residual particulate in the propanol bottles. However, it is also possible that the discrepancy reflects better particulate capture and retention in the jar containing propanol, since the jar containing only DI H_2O was frozen much of the time. For the Warm Springs sample (which also contained propanol), the total particulate mass collected was 10.1 mg.

With a diameter of 6.75 inches, the dustfall jars have a cross-sectional area of 35.78 in^2, or 0.0231 m^2. The calculated dustfall rates were 0.39 g/m^2 and 0.19 g/m^2 for the Opportunity samples, and 0.44 g/m^2 for the Warm Springs sample. This equals 0.21 g/m^2/month and 0.10 g/m^2/month at Opportunity, and 0.24 g/m^2/month at Warm Springs (based on a 30-day month). These values are very low when compared to the Montana settleable particulate standard of 10 g/m^2/month. It should be noted the dustfall samples discussed herein are basically at or below the method's stated detection limit of 0.2 g/m^2/month.

7. Data Quality Issues and Recommendations for Future Sampling and Analysis

The new evaporation and weighing procedure (implemented in January 2009) provides much better mass resolution –less than one mg, versus as much as 0.02-0.03 g (20-30 mg) previously. However, the results presented herein show that the use of propanol introduces an unacceptable level of uncertainty into the trace element results, even when a blank correction is used. Therefore, propanol will not be used for subsequent samples.

Other brands/grades of propanol could be evaluated for improved purity, though the brand that was used is considered a high grade. However, initial investigation has not identified a propanol source that will guarantee sufficiently low (e.g., 0.1 µg/L or less) trace element concentrations. A couple of purportedly ultra-pure – and very costly – brands only specify trace element concentrations at 10 ppb or less. The use of propanol may be considered for the 2009-2010 winter season, if a source of proven quality can be identified.

The differences in net particulate mass for the two Opportunity samples suggests that freezing may affect the dustfall jars' particulate collection efficiency. However, part of the discrepancy could be due to residual particulate in the propanol bottles. Since each dustfall sample used a total of 9 liters of propanol, even a very small mass of particulate per bottle could have a large aggregate effect on the total mass.

The trace element results for the Opportunity dustfall sample collected using only DI H_2O were comparable to results from previous glass dish dust sampling. However, the accompanying Field Blank (also prepared using only DI H_2O) had a significant concentration of lead. At present it is not known whether the contamination arose during preparation and/or transport of the Field Blank, or during evaporation of the sample in the laboratory. An additional Field Blank sample

was submitted with the dustfall samples collected during the period from April 5 – June 1, 2009 to confirm results.

TABLE 1 -- SUMMARY OF OPPORTUNITY / WARM SPRINGS DUSTFALL RESULTS
(Samples collected from 1-6-2009 to 3-2-2009)

A. Raw Analytical Results

Analyte	Opportunity (w/propanol) (ug/L)	Opportunity (no propanol) (ug/L)	Warm Springs (w/propanol) (ug/L)	Propanol Blank (ug/L)	Field Blank (no propanol) (ug/L)
As	26.9	1.54	50.2	2.37	0.062
Cd	0.132	0.069	0.612	0.381	0.121
Cu	18.2	5.49	51.2	2.14	0.143
Pb	3.44	1.11	13.6	0.516	1.01
Zn	38.7	26.0	46.4	13.0	2.11
Sample Volume (mL)	533	611	405	50 mL	955
Solids Weight (mg)	9.1	4.4	10.1	N/A	1.4
Solids (mg/L)	17.1	7.2	24.9	N/A	1.5
ND = Not Detected; NA = Not Applicable					

B. Total Trace Element Mass

Analyte	Opportunity (w/propanol) (ug/L)	Opportunity (no propanol) (ug/L)	Warm Springs (w/propanol) (ug/L)	Field Blank (no propanol) (ug/L)
As	14.3	0.941	20.3	0.059
Cd	0.070	0.042	0.248	0.116
Cu	9.70	3.35	20.7	0.137
Pb	1.83	0.678	5.51	0.965
Zn	20.6	15.9	18.8	2.02
Volume of alcohol used for sample (L)	9.0	0.0	9.0	0.0

C. Net Trace Element Mass (with mass contribution from propanol subtracted)

Analyte	Opportunity (w/propanol) (ug)	Opportunity (no propanol) (ug)	Warm Springs (w/propanol) (ug)	Field Blank (no propanol) (ug)
As	-6.99	0.941	-1.00	0.059
Cd	-3.36	0.042	-3.18	0.116
Cu	-9.56	3.35	1.48	0.137
Pb	-2.81	0.678	0.86	0.965
Zn	-96.4	15.9	-98.2	2.02
Volume of alcohol used for sample (L)	9.0	0.0	9.0	0.0

D. Trace Element Results (trace element mass per particulate mass)

Analyte	Opportunity (no propanol) (mg/kg)	Reporting Limit (mg/kg)	Opportunity (w/propanol) (mg/kg)	Warm Springs (w/propanol) (mg/kg)
As	**214**	**17.0**	-768	-98.9
Cd	**9.58**	**1.14**	-369	-315
Cu	**762**	**14.2**	-1050	146
Pb	**154**	**2.27**	-309	85.5
Zn	**3610**	**34.1**	-10590	-9724

Blacktail Consulting, Inc.
Air Quality / Meteorology / Data Quality
P.O. Box 4692
Butte MT 59702
USA
Ph (406) 498-4199
sheck@rfwave.net

MEMORANDUM – Opportunity / Warm Springs Settled Dust Sampling Event – Rev 1

Submitted by Steve Heck, Blacktail Consulting, Inc.

October 5, 2009

This memorandum describes the screening level results of settled dust sampling conducted at the Opportunity and Warm Springs air monitoring sites on behalf of Kuipers and Associates, and Anaconda-Deer Lodge County. All data, discussion and conclusions provided in this report are preliminary and will undergo a complete quality assurance review prior to issuance of final results in quarterly and annual reports in accordance with the project Sampling and Analysis Plan.

1. SAMPLE COLLECTION

On November 28, 2008, clean 9-inch diameter glass dishes were set out at both sites at a height of approximately 7 feet to capture and retain settling dust. A personal sampling pump supplied by SKC, Inc. was used to vacuum any settled dust from the dishes during twice-weekly site visits. Vacuuming could not be performed when standing water was present. In those instances, the water was allowed to evaporate, and vacuuming was performed at the next opportunity.

The vacuumed dust was collected onto 37-mm diameter, matched weight mixed cellulose ester (MCE) filter cassettes. The filters were recommended by the manufacturer for applications involving trace element analyses. The matched filter weights allow one to avoid filter pre-weighing. The total dust determination is made by simply weighing the two filters following sampling; the difference in their weights equals the mass of dust collected.

The glass dishes were vacuumed for the last time on March 2, 2009, and the cassettes were submitted to the MSE Laboratory for analysis. Both samples were weighed to determine the total amount of particulate collected. Samples having a sufficient net dust mass (≥ 1.0 mg) were analyzed for arsenic, cadmium, copper, lead and zinc.

2. ANALYTICAL PROCEDURES

Following weighing, exposed filters were digested using Method SW-846 3050B for soils, and analyzed for trace metals by ICP Mass Spectrometer (ICP-MS) using Method SW-846 6020A.

Two blank sampling cassettes (consisting of a total of four sample filters) were analyzed previously to provide background concentrations for the MCE filters.

3. ANALYTICAL RESULTS

Analytical results for these samples are presented in Table 1.

3.1 Filter Weights

The filters were weighed on an enclosed balance with a resolution of 0.0001 grams (0.1 mg). Results are shown in Section A of Table 1. The "Tare" filter weight is the weight of the unexposed matched weight filter, and the "Exposed" weight is the weight of the filter dust was collected on. The net dust weight is calculated as the difference between these values.

The mass of dust collected on the Opportunity filter was 1.0 mg, while the dust mass on the Warm Springs filter was only 0.8 mg. After the preceding set of glass dish dust samples was analyzed, the decision was made to perform trace element analyses on filters only if the collected particulate mass was at least 1.0 mg. For dust masses smaller than 1.0 mg, the weighing resolution (0.1 mg) introduces unacceptable uncertainty to the analytical results. Therefore, no trace element analyses were performed on the Warm Springs filter.

3.2 Trace Element Results

The trace element results are presented in Section B of Table 1. The "Total" results represent the trace element concentrations in the exposed filter – which includes contributions from both the filter material and the collected dust. Four blank filters were analyzed for trace elements in the fall of 2008, and overall blank concentrations calculated; these values are shown in the column labeled "Blank." Next, net filter trace element concentrations were calculated by subtracting the blank values from the total values. The net results represent the average trace element concentrations throughout the filter based solely on the contribution from the collected dust.

3.3. Trace Element Concentrations in Dust

The net trace element concentrations in Section B are for the entire exposed filter mass. Trace element concentrations in the collected dust were calculated using the net trace element results, the exposed filter weight and the collected dust weight. For the Opportunity site, the net dust weight was 0.0010 grams, while the total weight of the exposed MCE filter was 0.0498 grams. The following example illustrates the calculation used to determine trace element concentrations in the exposed dust:

- Concentration of arsenic over the entire exposed filter was 3.29 mg/kg. Therefore, the amount of arsenic present was 3.29 mg/kg x 0.0498 g, or 1.638×10^{-4} mg.
- Because all of this net arsenic concentration was contained in the dust portion, the arsenic concentration in dust was 1.638×10^{-4} mg / 0.0010 g, or 164 mg/kg.

The concentrations of other trace elements in the dust were calculated using the same approach. Results are summarized in Section C.

Disassembly and weighing of the filter cassettes proceeded smoothly for these samples, and no analytical issues were encountered. However, the resolution of the results is limited because the amount of dust collected was small. The resulting analyte reporting limits are quite high; however, all of the calculated trace element concentrations were higher than these limits. At Opportunity, the calculated arsenic concentration of 164 mg/kg was a little over twice the reporting limit, while the lead concentration of 133 mg/kg was approximately 13 times higher.

4. RECOMMENDATIONS FOR FUTURE SAMPLING AND ANALYSIS

The laboratory analysis proceeded smoothly for these filters. However, the results presented herein are of limited resolution because of uncertainties introduced by the small masses of dust collected. This was largely a consequence of the weather. The dishes contained snow and/or snowmelt much of the time, and were dumped several times to improve the prospect for collection of dust on future site visits. This no doubt resulted in the loss of settled dust. Additionally, the ground was wet and/or snow covered during much of the data collection period, decreasing the potential for windblown dust.

Recently, a second glass dish was installed at both sites, which will effectively double the amount of particulate collected (given identical conditions). Dust collection should become easier in the coming months, as 1) higher temperatures will lead to increased evaporation, and 2) the absence of snow cover may increase the amount of windblown dust.

TABLE 1 - OPPORTUNITY / WARM SPRINGS SETTLED DUST SAMPLE RESULTS
(Sampling conducted 11-28-2008 through 03-02-2009)

A. Filter Weight Data

Opportunity Exposed Filter Weight (g)	0.0498
Opportunity Tare Filter Weight (g)	0.0488
Opportunity Net Particulate Weight (g)	0.0010

Warm Springs Exposed Filter Weight (g)	0.0507
Warm Springs Tare Filter Weight (g)	0.0499
Warm Springs Net Particulate Weight (g)	0.0008

B. Trace Element Results

	Opportunity			***Blank*** (1)
Analyte	Total Filter Conc. (mg/kg)	Net Filter Conc. (mg/kg)	Reporting Limit (mg/kg)	Average Conc. (mg/kg)
As	3.29	3.29	1.51	ND
Cd	0.124	0.117	0.10	0.007
Cu	13.5	13.2	1.26	0.317
Pb	2.75	2.68	0.201	0.074
Zn	33.8	21.6	3.01	12.2

(1) Blank concentration based on average of four unexposed filters

C. Calculated Trace Element Concentrations in Particulate

	Opportunity		
Analyte	Net Filter Conc. (mg/kg)	***Net Particulate Conc. (mg/kg)***	(1) Reporting Limit (mg/kg)
As	3.29	***164***	75.2
Cd	0.117	***5.83***	4.98
Cu	13.2	***657***	62.7
Pb	2.68	***133***	10.0
Zn	21.6	***1076***	150

(1) Reporting Limit adjusted to reflect mass of particulate collected

Warm Springs sample not analyzed for trace elements due to insufficient dust mass.

APPENDIX C

E-BAM PERFORMANCE CHECK / MAINTENANCE PROCEDURES FIRST QUARTER 2009

1.1 Performance Check / Maintenance Procedures

1.1.1 E-BAM Sampler

Several checks are performed on the E-BAM sampler, including both its particulate monitoring system and the internal barometric pressure sensor.

1.1.1.1 Leak Check (E-BAM Manual Section 2.4.1.1)

Each month, the E-BAM sampler is checked for leaks in the sampling train that could compromise data integrity. This check is performed by installing a BX-302 valve/filter assembly in place of the sampling inlet, and running the sampler in its "pump test" mode while slowly closing the valve. The check is considered satisfactory if the flow drops to below 1.5 LPM.

1.1.1.2 Operating Flow Rate Check (E-BAM Manual Section 2.4.1.5)

The operating flow rate check is performed monthly by installing an NIST-traceable BGI Delta-Cal flow monitor in place of the sampling inlet, and comparing the indicated flow against the target of 16.7 LPM. The check is considered satisfactory if the indicated flow is within +/- 2% of the target value. Otherwise, the flow is adjusted at set points of 14.0 LPM and 17.5 LPM, and the operating flow re-checked.

A successful operating flow rate check, when preceded by a successful leak check, proves that the E-BAM sampler is collecting valid PM_{10} data.

1.1.1.3 Pump Test (E-BAM Manual Section 2.4.1.7)

The pump test is performed monthly to verify the robustness of the pump; poor results indicate that the pump is nearing the end of its life. The BX-302 valve/filter assembly is installed in place of the sampling inlet, and – with the sampler running in the "pump test" mode – partially closed to obtain an indicated flow rate between 14 and 15 LPM. The pump condition pressure reading displayed by the E-BAM then is compared against the appropriate value listed in Figure 34 of the E-BAM manual, providing an evaluation of the pump's condition.

1.1.1.4 Zero/Span Check (E-BAM Manual Section 2.4.3.1)

Zero and span membrane plates supplied with each sampler are used quarterly to check the calibration of the E-BAM sampler's beta attenuation detector (The manual indicates this check is not required until after 6 months of operation). These plates simulate specific particulate loads when used in conjunction with a blank filter tape. The checks are performed within the E-BAM sampler's "membrane test" menu, which directs the user to install and remove the plates at specified times. At the conclusion of the test, the display screen indicates whether the calibration test was successful. The membrane plates are certified by the manufacturer.

1.1.1.5 Clean Valve and Nozzle (E-BAM Manual Section 2.4.5)

The sampler's sample inlet nozzle (located directly above the filter tape) and vane (located directly beneath the filter tape) are cleaned monthly with a modified Q-tip using isopropyl alcohol. Care is taken that no excess alcohol drips into the vane assembly, which could affect the unit's calibration. Immediately after performing this maintenance, the leak check described in Section 1.1.1.1 is repeated to ensure that the sample train integrity was not compromised.

1.1.1.6 Clean PM_{10} Inlet (E-BAM Manual Appendix H)

Each month the PM_{10} inlet is removed from the sampler, disassembled and cleaned using paper towels and isopropyl alcohol. Additionally, all o-rings are lubricated with stopcock grease as necessary.

1.1.1.7 Barometric Pressure Sensor Check (E-BAM Manual Section 2.4.1.4)

The E-BAM's internal barometer is checked monthly using a Wallace and Tiernan aneroid barometer that is routinely checked against a mercury wall barometer. If the results agree within +/- 2 mmHg, no adjustment is necessary.

1.1.2 Meteorological Sensors

1.1.2.1 Temperature (E-BAM Manual Section 2.4.1.3)

The E-BAM manual specifies a two-point calibration procedure using an ambient temperature and an ice bath. However, the manufacturer indicated that a single-point field calibration check was generally sufficient. Disassembly of the sensor for placement in an ice bath is not trivial, and is impractical as a routine field activity.

The temperature sensor is checked monthly at ambient conditions using an Assmann Psychrometer that has been certified against an NIST-traceable mercury thermometer. If the readings agree to within 0.5 degrees Celsius, no adjustment is necessary.

1.1.2.2 Relative Humidity (Model 593 Relative Humidity Sensor Operation Manual)

The Model 593 Manual indicates that recalibration (requiring additional specialized equipment) is required only if the sensor element is replaced in the field. For this project, calibration of the relative humidity sensor will be limited to monthly collocated checks using an Assmann Psychrometer that is certified against an NIST-traceable mercury thermometer. Wet-bulb and dry-bulb temperatures, together with ambient barometric pressure, are used with psychrometric tables to calculate a true relative humidity, which is compared against the E-BAM display. If the indicated relative humidity agrees with that obtained by the Assmann psychrometer to within +/- 5% relative humidity, the results are considered acceptable. If consistently unacceptable results are obtained, the relative humidity sensor will be returned to the manufacturer for re-calibration and/or repair.

1.1.2.3 Wind Speed (Model 034B Wind Sensor Operation Manual)

The Model 034B Manual recommends an initial check of the unit's response to a known rotation rate. This is being done monthly in the field using a 300 rpm synchronous motor to produce a known wind speed of 18.49 mph (8.27 m/s). The manual specifies an accuracy of +/- 0.25 mph (0.11 m/s) at speeds below 22.7 mph (10.1 m/s). Additionally, the response of the sensor when stopped is observed; it should be 0.3 +/- 0.1 m/s.

1.1.2.4 Wind Direction (Model 034B Wind Sensor Operation Manual)

The manual does not specify routine checks for the wind direction sensor, beyond an initial check to confirm that the sensor's readout increases from 0 to 360 degrees as the shaft is turned clockwise. However, routine checks are performed monthly to verify proper operation. First, the sensor's alignment is verified by locking the sensor in place with its alignment pin, and ensuring that a response of between 178 and 182 degrees is obtained. Next, the sensor's linearity is verified by turning it in 90-degree intervals (using the sensor crossarm as a visual reference), and confirming that the E-BAM display's direction indication changes by 90 +/- 3 degrees with each step.

The initial orientation of the sensor was performed using a solar sighting in conjunction with NIST time (WWV) to establish precise direction azimuths. The use of solar sightings – rather than magnetic compass readings – negates any localized magnetic influences.

1.1.2.5 Filter Temperature and Humidity (E-BAM Manual Sections 2.4.2.1 and 2.4.2.2)

The E-BAM Manual includes provisions for adjusting the response of both of these parameters. However, there is no practical way to accurately check either parameter with an external reference standard. Therefore, checks of these parameters will be limited to review of downloaded data files for suspicious behavior.

1.2 Performance Check Results

Each set of performance check results is presented in Appendix D. Results obtained during the first quarter of 2009 were satisfactory

APPENDIX D

E-BAM PERFORMANCE CHECK RESULTS

OPPORTUNITY SITE

		DATE	1/9/2009	1/16/2009	2/20/2009
		INITIALS	SH	SH	SH
		EBAM OFF-LINE@	NA	1342	1636
		EBAM BACK ON-LINE@	NA	1445	1659
				Monthly checks	Monthly checks
METEOROLOGICAL PARAMETERS					
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated		2.9		2.5
	Audit		2.9		2.1
Ambient RH Check (+/- 5% RH)	EBAM-Indicated		43%		42%
	Audit (Td/Tw)		2.9 / -1.6		2.1 / -2.2
	Audit RH		39.0%		39.8%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped			0.3	0.3
	EBAM-Spinning			2.5	2.9
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated			8.3	8.3
	Known			8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated			641.9	637.0
	Audit			642	637
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)			179	179
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm			155	154
	+90 degrees			247	245
	+180 degrees			334	333
	+270 degrees			67	66
	+360 degrees			156	154
EBAM SAMPLER					
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result			0.9 LPM	0.9 LPM
	Leak repaired?			NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found			16.75	16.72
	As left (if recalibrated)			NA	NA
Flow Calibration - Low Flow (if necessary)	As found			NA	NA
	As left			NA	NA
Flow Calibration - High Flow (if necessary)	As found			NA	NA
	As left			NA	NA
Pump Test (see 2.4.1.7)	Pressure mm Hg			357 @ 14.3	338 @ 14.5
Clean Nozzle (see 2.4.5)	Confirm (X)			X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)			NA	NA
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail			0.349 (Pass)	NA
	Span Pass/Fail			0.945 (Pass)	NA
Confirm Leak Check (after maintenance)	Result			0.9 LPM	0.9 LPM
	Leak repaired?			NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

OPPORTUNITY SITE

	DATE	3/12/2009	3/13/2009	4/5/2009 (B)
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1145 MST	INSTALLED	1502 MST
	EBAM BACK ON-LINE@	REMOVED	1230 MST	1546 MST
		A	A	Monthly checks
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	-1.6	6.6	8.1
	Audit	-1.6	6.5	7.2
Ambient RH Check (+/- 5% RH)	EBAM-Indicated			29%
	Audit (Td/Tw)			7.2 / 0.9
	Audit RH			29.7%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped			0.3
	EBAM-Spinning			3.2
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated			8.3
	Known			8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	639.0	635.8	641.8
	Audit	639	636	642
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	179	179	180
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm			155
	+90 degrees			244
	+180 degrees			336
	+270 degrees			66
	+360 degrees			154
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.9 LPM	0.9 LPM	0.9 LPM
	Leak repaired?	NA	NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.56	16.76	16.81
	As left (if recalibrated)	NA	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Pump Test (see 2.4.1.7)	Pressure mm Hg	NA	NA	363 @ 14.5
Clean Nozzle (see 2.4.5)	Confirm (X)	NA	NA	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	NA	NA	NA
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	NA	NA	0.345 (Pass)
	Span Pass/Fail	NA	NA	0.938 (Pass)
Confirm Leak Check (after maintenance)	Result	NA	NA	0.9 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Sampler was taken offsite for annual calibrations and maintenance.

WARM SPRINGS SITE

	DATE	1/9/2009	1/16/2009	2/20/2009
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	NA	1215 MST	1520 MST
	EBAM BACK ON-LINE@	NA	1310 MST	1555 MST
			Monthly checks	Monthly checks
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	2.1		5.2
	Audit	2.2		4.5
Ambient RH Check (+/- 5% RH)	EBAM-Indicated	47%		32%
	Audit (Td/Tw)	2.2 / -1.8		4.5 / -1.0
	Audit RH	44.3%		31.3%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped		0.3	0.3
	EBAM-Spinning		0.8	2.1
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated		8.3	8.3
	Known		8.27	8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated		645.7	639.9
	Audit		645	639
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated		179	179
	(with pin locked)			
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm		190	191
	+90 degrees		280	281
	+180 degrees		10	10
	+270 degrees		102	103
	+360 degrees		190	189
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result		0.5 LPM	0.5 LPM
	Leak repaired?		NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found		16.78	16.72
	As left		NA	NA
	(if recalibrated)			
Flow Calibration - Low Flow (if necessary)	As found		NA	NA
	As left		NA	NA
Flow Calibration - High Flow (if necessary)	As found		NA	NA
	As left		NA	NA
Pump Test (see 2.4.1.7)	Pressure mm Hg		358 @ 14.2	385 @ 14.8
Clean Nozzle (see 2.4.5)	Confirm (X)		X	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)		X	X
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail		0.354 (Pass)	NA
	Span Pass/Fail		0.960 (Pass)	NA
Confirm Leak Check (after maintenance)	Result		0.5 LPM	0.5 LPM
	Leak repaired?		NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

WARM SPRINGS SITE

	DATE	3/9/2009	3/11/2009	4/5/2009 (B)
	INITIALS	SH	SH	SH
	EBAM OFF-LINE@	1405 MST	1440 MST	1302 MST
	EBAM BACK ON-LINE@	REMOVED	INSTALLED	1325 MST
		A	A	Monthly checks
METEOROLOGICAL PARAMETERS				
Ambient Temperature (+/- 1 deg C)	EBAM-Indicated	-3.1	-4.3	6.6
	Audit	-3.5	-4.1	5.8
Ambient RH Check (+/- 5% RH)	EBAM-Indicated			32%
	Audit (Td/Tw)			5.8 / 0.1
	Audit RH			32.2%
Wind Speed Response (0.2-0.4 m/s stopped)	EBAM-Stopped			0.3
	EBAM-Spinning			1.5
Wind Speed - motor (+/- 0.1 m/s)	EBAM-Indicated			8.3
	Known			8.27
Ambient BP Check (+/- 2 mm Hg)	EBAM-Indicated	632.6	639.9	645.2
	Audit	632	640	645
Wind Direction Orientation (178 - 182 deg)	EBAM-Indicated (with pin locked)	178	179	179
Wind Direction Linearity (referenced to crossarm) (+/- 3 deg. linearity)	Along crossarm			190
	+90 degrees			282
	+180 degrees			12
	+270 degrees			102
	+360 degrees			190
EBAM SAMPLER				
Leak Check (see 2.4.1.1) (Allowed <1.5 LPM)	Result	0.5 LPM	0.5 LPM	0.5 LPM
	Leak repaired?	NA	NA	NA
Operating Flow (see 2.4.1.5) (Target 16.7 LPM, allowed range 16.37-17.03)	As found	16.72	16.48	16.76
	As left (if recalibrated)	NA	NA	NA
Flow Calibration - Low Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Flow Calibration - High Flow (if necessary)	As found	NA	NA	NA
	As left	NA	NA	NA
Pump Test (see 2.4.1.7)	Pressure mm Hg	NA	NA	364 @ 14.4
Clean Nozzle (see 2.4.5)	Confirm (X)	NA	NA	X
Clean PM-10 Inlet (Appdx H)	Confirm (X)	NA	NA	X
Zero/Span Verification (Quarterly - see 2.4.3.1)	Zero Pass/Fail	NA	NA	0.353 (Pass)
	Span Pass/Fail	NA	NA	0.965 (Pass)
Confirm Leak Check (after maintenance)	Result	NA	NA	0.5 LPM
	Leak repaired?	NA	NA	NA

Audit and Calibration Standards	***Wind Speed:***	300 RPM synchronous motor
	Temp / RH:	Assmann Psychrometer, Dry S/N 6782, Wet S/N 709085
	Bar. Pressure:	W & T Model FA185260, S/N LL03297; Delta Cal S/N 498
	Wind Direction:	Initially oriented using solar sighting
	EBAM Flows etc.:	BGI Delta Cal, S/N 498

A = Sampler was taken offsite for annual calibrations and maintenance.
B = Wind sensor checks performed 4-27-2009.

RESULTS OF ANNUAL CALIBRATION CHECKS

TABLE 1 -- EBAM CALIBRATION / FLOW CHECK RESULTS

A. Results for Opportunity EBAM (S/N 7290)

Membrane Tests
(Known value = 0.937 mg/m^3, allowable error = +/- 5%)

Date	Test Result (mg/m^3)	% Error
1/19/2008	0.931	-0.6
4/17/2008	0.933	-0.4
7/25/2008	0.943	0.6
10/5/2008	0.947	1.1
1/16/2009	0.945	0.9

Flow Checks (Target value is 16.7 LPM, allowable error +/- 2%)

Date	Flow Check Result (LPM)	% Error
3/12/2009	16.56	-0.8
3/13/2009	16.76	0.4

Leak Checks (Must be <= 1.5 LPM)

Date	Flow Check Result
3/12/2009	0.9
3/13/2009	0.9

B. Results for Warm Springs EBAM (S/N 7289)

Membrane Tests
(Known value = 0.973 mg/m^3, allowable error = +/- 5%)

Date	Test Result (mg/m^3)	% Error
1/19/2008	0.956	-1.7
4/17/2008	0.968	-0.5
7/25/2008	0.982	0.9
10/14/2008	0.936	-3.8
1/16/2009	0.960	-1.3

Flow Checks (Target value is 16.7 LPM, allowable error +/- 2%)

Date	Flow Check Result (LPM)	% Error
3/9/2009	16.72	0.1
3/11/2009	16.48	-1.3

Leak Checks (Must be <= 1.5 LPM)

Date	Flow Check Result
3/9/2009	0.5
3/11/2009	0.5

TABLE 2
METEOROLOGICAL SENSOR CALIBRATION CHECK RESULTS
E-BAM S/N 7290 (OPPORTUNITY) - AS FOUND

Sensor Model and Serial No.	Parameter and Units	Date	Time (MST)	Known Value	Sensor Response	Difference of Response - Known	Average
EBAM Internal Barometer	Barometric Pressure (mm Hg)	3/12/2009	1115	639	639.0	0.0	0.4
		3/12/2009	1826	619	620.3	1.3	
		3/13/2009	1200	636	635.8	-0.2	
Met One 592 S/N F9487	Temperature (degrees Celsuis) 15-minute averages	3/12/2009	1745	21.8	21.9	0.1	0.1
			1800	21.8	21.8	0.0	
			1815	22.0	22.2	0.2	
		3/12/2009	1930	-6.1	-5.6	0.5	0.6
			1945	-6.3	-5.7	0.6	
Met One 593 S/N F9346	Relative Humidity (percent)	3/12/2009	1810	30.3	32	1.7	1.0
			2030	63.8	64	0.2	
Met One 034B S/N G2181	Wind Direction Degree Wheel (degrees)	3/12/2009	N/A	0	1	1	0
			N/A	10	9	-1	
			N/A	45	45	0	
			N/A	90	90	0	
			N/A	135	136	1	
			N/A	180	180	0	
			N/A	225	224	-1	
			N/A	270	269	-1	
			N/A	315	313	-2	
			N/A	350	348	-2	
			N/A	0	1	1	
	Wind Direction Alignment Pin	3/12/2009	N/A	180	179	-1	-1
	Bearing Check: Wind direction potentiometer turned freely.						
Met One 034B S/N G2181	Wind Speed Mechanical Check (0, 300, 600 rpm)	3/12/2009	N/A	0.3	0.3	0.0	0.0
			N/A	8.3	8.3	0.0	
			N/A	16.3	16.2	-0.1	
	Bearing Check: Wind speed cups turned freely.						

TABLE 3
METEOROLOGICAL SENSOR CALIBRATION CHECK RESULTS
E-BAM S/N 7290 (OPPORTUNITY) - AFTER ADJUSTMENT

Sensor Model and Serial No.	Parameter and Units	Date	Time (MST)	Known Value	Sensor Response	Difference of Response - Known	Average
Met One 592 S/N F9487	Temperature (degrees Celsuis) 15-minute averages	3/12/2009	2015	-7.4	-7.6	-0.2	-0.2
			2030	-7.3	-7.7	-0.4	
			2045	-7.7	-7.8	-0.1	
		3/12/2009	2300	21.8	22.0	0.2	0.2
			2315	21.6	21.8	0.2	
			2330	21.4	21.6	0.2	
Met One 034B S/N G2181	Wind Direction Degree Wheel (degrees)	3/12/2009	N/A	0	1	1	0
			N/A	10	10	0	
			N/A	45	46	1	
			N/A	90	90	0	
			N/A	135	134	-1	
			N/A	180	179	-1	
			N/A	225	224	-1	
			N/A	270	269	-1	
			N/A	315	315	0	
			N/A	350	349	-1	
			N/A	0	1	1	
	Wind Direction Alignment Pin	3/12/2009	N/A	180	180	0	0
	Bearing Check: Wind direction potentiometer turned freely.						
Met One 034B S/N G2181	Wind Speed Mechanical Check (0, 300, 600 rpm)	3/12/2009	N/A	0.3	0.3	0.0	0.0
			N/A	8.3	8.3	0.0	
			N/A	16.3	16.2	-0.1	
	Bearing Check: Wind speed cups turned freely.						

Note: No adjustments were made to the internal barometer, or the relative humidity sensor.

TABLE 4
METEOROLOGICAL SENSOR CALIBRATION CHECK RESULTS
E-BAM S/N 7289 (WARM SPRINGS) - AS FOUND

Sensor Model and Serial No.	Parameter and Units	Date	Time (MST)	Known Value	Sensor Response	Difference of Response - Known	Average
EBAM Internal Barometer	Barometric Pressure (mm Hg)	3/9/2009	1430	632	632.6	0.6	0.2
		3/10/2009	1730	615	615.0	0.0	
		3/11/2009	1115	640	639.9	-0.1	
Met One 592 S/N F9481	Temperature (degrees Celsuis) 15-minute averages	3/10/2009	0900	-13.4	-13.1	0.3	0.4
			0915	-12.7	-12.3	0.4	
			0930	-13.5	-13.0	0.5	
		3/10/2009	1145	20.1	18.3	-1.8	-1.8
			1200	20.1	18.4	-1.7	
			1215	20.7	18.7	-2.0	
Met One 593 S/N F9349	Relative Humidity (percent)	3/10/2009	0956	57.5	57	-0.5	0.8
			1236	29.9	32	2.1	
Met One 034B S/N G2187	Wind Direction Degree Wheel (degrees)	3/10/2009	N/A	0	1	1	-2
			N/A	10	8	-2	
			N/A	45	43	-2	
			N/A	90	88	-2	
			N/A	135	133	-2	
			N/A	180	177	-3	
			N/A	225	224	-1	
			N/A	270	267	-3	
			N/A	315	311	-4	
			N/A	350	347	-3	
			N/A	0	1	1	
	Wind Direction Alignment Pin	3/10/2009	N/A	180	178	-2	-2
	Bearing Check: Wind direction potentiometer turned freely.						
Met One 034B S/N G2187	Wind Speed Mechanical Check (0, 300, 600 rpm)	3/10/2009	N/A	0.3	0.3	0.0	0.0
			N/A	8.3	8.3	0.0	
			N/A	16.3	16.2	-0.1	
	Bearing Check: Wind speed cups turned freely.						

TABLE 5
METEOROLOGICAL SENSOR CALIBRATION CHECK RESULTS
E-BAM S/N 7289 (WARM SPRINGS) - AFTER ADJUSTMENT

Sensor Model and Serial No.	Parameter and Units	Date	Time (MST)	Known Value	Sensor Response	Difference of Response - Known	Average
Met One 592 S/N F9481	Temperature (degrees Celsuis) 15-minute averages	3/10/2009	1500	-6.1	-6.0	0.1	0.1
			1515	-6.3	-6.2	0.1	
		3/10/2009	1700	19.4	19.4	0.0	0.1
			1715	19.5	19.6	0.1	
Met One 034B S/N G2187	Wind Direction Degree Wheel (degrees)	3/10/2009	N/A	0	1	1	-2
			N/A	10	7	-3	
			N/A	45	43	-2	
			N/A	90	88	-2	
			N/A	135	133	-2	
			N/A	180	178	-2	
			N/A	225	224	-1	
			N/A	270	268	-2	
			N/A	315	313	-2	
			N/A	350	347	-3	
			N/A	0	1	1	
	Wind Direction Alignment Pin	3/10/2009	N/A	180	178	-2	-2
	Bearing Check: Wind direction potentiometer turned freely.						
Met One 034B S/N G2187	Wind Speed Mechanical Check (0, 300, 600 rpm)	3/10/2009	N/A	0.3	0.3	0.0	0.0
			N/A	8.3	8.3	0.0	
			N/A	16.3	16.2	-0.1	
	Bearing Check: Wind speed cups turned freely.						

Note: No adjustments were made to the internal barometer, or the relative humidity sensor.

APPENDIX E

AIR QUALITY SYSTEM NULL DATA QUALIFIER CODES FIRST QUARTER 2008

Opportunity Site January 2009 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																								
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	3	3	-5	-2	0	1	-2	-4	3	-4	3	3	34	-5	-5	-4	BA	-5	-1	-3	2	3	1	8	23	1.0
2	11	-5	19	2	3	-4	3	9	3	4	8	AV	12	4	AV	AV	AV	-5	-3	16	4	25	-3	2	20	5.3
3	-4	2	-3	-4	-3	4	5	-3	-3	-3	-3	-5	-4	-4	1	1	2	-1	15	17	-2	-5	2	6	24	0.3
4	2	-1	4	-5	0	5	-3	-1	2	1	-4	-5	1	2	0	-4	-3	-5	3	1	2	-1	16	3	24	0.4
5	4	-5	-2	40	69	3	24	17	7	21	9	6	0	3	14	2	0	-5	2	-2	-3	3	0	-1	24	8.6
6	-5	1	-3	5	0	-1	1	-5	0	-4	-3	-5	3	-2	-1	-3	3	-3	-5	-2	3	-5	3	-5	24	-1.4
7	-5	1	-1	4	-2	3	3	-5	-5	-3	-2	-4	-5	-4	1	-4	1	0	-2	-3	-3	-5	2	-3	24	-1.7
8	-5	-3	-4	2	1	-4	-4	-4	4	-5	1	0	2	4	-2	-2	-5	-3	3	-4	18	19	1	-4	24	0.3
9	-5	2	1	3	9	-5	5	2	4	-2	-1	-5	2	-4	6	0	1	0	-1	3	2	-2	-5	1	24	0.5
10	0	1	0	2	6	0	-2	4	-1	7	6	2	-4	9	4	-5	-1	-3	-2	1	-1	-3	1	-2	24	0.8
11	3	2	1	-4	-1	-5	-3	0	3	-2	-4	6	0	6	0	0	3	1	-1	-5	-4	2	7	2	24	0.3
12	-5	3	4	-3	8	-2	-1	21	12	1	4	6	2	0	-4	-2	0	-2	4	-2	-5	-2	1	-2	24	1.5
13	0	-4	2	0	-1	7	15	15	50	8	6	8	2	4	1	2	-1	-5	-5	1	-5	2	3	-5	24	4.2
14	3	-4	3	-1	2	4	3	24	10	19	2	34	16	15	5	20	7	1	4	1	-2	4	-2	4	24	7.2
15	2	3	5	5	1	4	13	20	1	10	-1	5	0	25	31	11	58	9	11	22	11	9	11	39	24	12.7
16	7	1	7	2	-1	-3	-1	-2	3	-5	10	3	4	8	BA	7	12	4	15	20	11	12	9	13	23	5.9
17	6	-1	4	4	-1	4	6	16	6	11	5	4	8	6	5	10	14	4	12	14	42	27	5	8	24	9.1
18	9	9	7	31	10	-2	13	9	4	12	3	17	6	5	13	13	4	13	23	18	25	53	23	22	24	14.2
19	24	31	24	27	17	16	14	27	26	12	18	24	119	40	32	28	21	17	24	30	19	23	18	25	24	27.3
20	29	13	-1	8	18	-4	20	28	10	6	65	67	30	30	23	22	50	50	24	43	27	11	3	11	24	24.3
21	-5	28	25	27	30	28	21	12	-2	32	22	31	46	27	26	27	41	21	38	43	27	9	14	0	24	23.7
22	5	5	-4	-4	5	8	12	105	115	2	10	26	28	47	28	6	5	3	12	23	28	17	14	14	24	21.3
23	8	7	12	16	19	24	21	13	18	15	12	17	16	16	BA	32	26	20	23	17	29	21	24	30	23	19.0
24	15	21	11	16	18	14	18	22	31	14	19	12	23	18	23	16	31	20	12	15	35	0	14	51	24	19.5
25	25	27	9	9	13	4	12	7	6	4	9	8	-1	-1	7	1	3	7	4	10	26	12	20	15	24	9.8
26	29	13	2	4	12	3	12	9	12	-5	2	-5	2	-4	6	11	BA	11	12	8	2	-2	9	4	23	6.4
27	2	1	0	2	1	-5	1	-5	4	-1	0	3	1	9	10	25	49	81	77	11	17	13	21	8	24	13.5
28	11	24	15	3	4	-3	0	17	-4	29	10	3	3	22	7	24	20	13	2	3	6	17	-2	-3	24	9.2
29	10	-1	0	-1	2	-3	-2	2	-5	7	-3	5	1	5	11	125	38	9	5	2	0	2	-5	-5	24	8.3
30	1	-1	3	2	-1	-3	6	-5	11	-2	1	7	3	3	6	4	3	-3	2	1	1	6	9	5	24	2.5
31	3	27	6	5	4	10	-4	19	3	-2	11	5	8	0	11	32	40	39	21	-2	5	-2	7	3	24	10.4
NO.	31	31	31	31	31	31	31	31	31	31	31	30	31	31	28	30	28	31	31	31	31	31	31	31		
MAX.	29	31	25	40	69	28	24	105	115	32	65	67	119	47	32	125	58	81	77	43	42	53	24	51		
AVG.	6	6	5	6	8	3	7	12	11	6	7	9	12	9	9	13	15	9	11	10	10	8	7	8		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Opportunity Site February 2009 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-5	11	16	1	2	3	-5	0	3	6	6	4	3	-5	7	2	10	9	-1	-1	-2	5	2	4	24	3.1
2	11	8	3	-1	4	4	3	2	8	2	2	-2	BA	-3	3	24	15	3	1	6	15	13	8	1	23	5.7
3	2	2	6	-5	0	2	-2	5	-3	3	10	13	13	5	2	6	9	3	6	-2	13	4	1	1	24	3.9
4	-2	0	4	3	-4	-2	10	4	11	9	13	6	12	12	4	12	1	2	5	9	9	7	2	3	24	5.4
5	-1	1	-1	1	2	-3	-3	6	10	14	17	21	13	5	3	16	4	14	4	-1	3	8	7	4	24	6.0
6	-5	7	-4	3	4	0	1	4	4	4	4	8	-3	2	10	-1	6	13	1	6	-4	0	-2	-2	24	2.3
7	1	7	1	2	4	8	0	-5	10	1	-3	0	-5	0	6	7	5	9	6	30	21	12	16	9	24	5.9
8	5	4	-1	6	3	4	3	6	-4	-3	-1	9	5	2	17	8	11	9	4	5	2	19	22	14	24	6.2
9	18	9	13	9	11	6	8	12	11	7	2	24	26	11	17	21	10	6	4	14	7	4	5	0	24	10.6
10	10	3	3	-2	2	5	-5	2	-5	-5	2	-1	10	-5	-5	-1	11	3	8	5	-2	5	4	8	24	2.1
11	10	3	0	-3	-2	-1	0	3	6	-1	4	-1	-1	-2	-1	0	9	2	8	1	8	12	16	3	24	3.0
12	3	1	1	1	4	2	5	7	9	4	1	5	-1	16	27	19	14	5	11	5	6	11	10	11	24	7.4
13	9	20	5	-1	5	3	13	1	2	1	8	10	7	5	9	5	7	12	9	9	6	13	6	16	24	7.5
14	-4	0	10	9	0	0	6	0	5	8	-5	11	5	5	2	6	21	22	11	15	13	22	33	18	24	8.9
15	10	9	-4	11	5	4	5	2	-1	6	-1	12	-5	3	4	-1	-4	0	1	3	3	4	0	-5	24	2.5
16	1	1	2	1	3	2	-2	0	-5	3	22	5	11	-2	0	6	6	11	18	10	11	1	10	0	24	4.8
17	3	11	1	10	4	8	12	11	4	16	22	12	13	23	14	23	16	2	3	10	4	1	3	4	24	9.6
18	-2	5	-3	5	5	2	2	15	3	23	3	14	5	5	10	5	-1	-2	14	-2	2	1	0	5	24	4.8
19	15	5	-2	-1	0	-5	0	4	7	0	0	4	4	5	5	0	2	-5	-4	4	4	0	-4	2	24	1.7
20	-4	-5	-5	0	3	4	-3	0	5	9	34	114	17	14	11	5	BA	4	3	12	9	33	22	16	23	13.0
21	0	1	10	-3	-3	4	7	1	1	11	18	2	8	4	10	14	11	17	3	18	24	24	23	22	24	9.5
22	-1	2	-1	3	6	9	5	7	2	3	14	14	14	10	4	12	1	11	9	13	7	4	7	8	24	6.8
23	7	0	6	7	38	2	-3	-2	2	-1	11	14	15	7	5	-1	1	5	2	2	-2	3	7	12	24	5.7
24	-3	-1	7	-5	4	3	-2	10	4	3	9	-5	4	8	2	-3	6	7	1	0	-2	-1	0	1	24	2.0
25	-5	0	3	-1	-5	0	-2	9	0	-2	-2	0	0	0	10	-5	4	3	22	12	1	0	-5	3	24	1.7
26	-5	4	3	5	6	3	-4	-3	-3	6	1	6	AM	AM	AM	AM	AM	15	-5	9	-3	2	0	-3	19	1.8
27	6	1	8	8	2	4	0	-3	-5	-5	4	-4	3	0	2	-1	3	3	5	6	18	6	20	1	24	3.4
28	11	16	5	5	-5	5	1	-3	0	1	5	22	13	16	10	11	10	7	2	13	5	4	0	8	24	6.8
NO.	28	28	28	28	28	28	28	28	28	28	28	28	26	27	27	27	26	28	28	28	28	28	28	28		
MAX.	18	20	16	11	38	9	13	15	11	23	34	114	26	23	27	24	21	22	22	30	24	33	33	22		
AVG.	3	4	3	2	4	3	2	3	3	4	7	11	7	5	7	7	7	7	5	8	6	8	8	6		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Opportunity Site March 2009 (All values are TSP in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																								
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	2	-4	0	1	-1	-3	4	-4	-4	-1	6	6	3	3	3	7	15	5	2	10	5	22	8	2	24	3.6
2	15	4	5	3	1	4	-3	4	9	12	18	8	10	11	5	7	BA	15	13	15	93	14	10	4	23	12.0
3	1	5	-4	-2	2	2	3	4	3	-2	4	5	1	9	47	13	7	8	6	5	-3	4	5	7	24	5.4
4	1	1	10	3	8	2	0	2	-3	5	13	0	1	6	4	3	7	-3	3	3	5	9	5	10	24	4.0
5	5	0	10	1	1	-1	2	-3	-1	2	4	18	15	63	28	3	17	7	0	3	0	13	18	-5	24	8.3
6	18	8	24	60	64	-5	6	3	-3	-4	10	11	5	-1	14	9	-2	6	8	10	10	13	3	1	24	11.2
7	-2	1	2	3	-5	1	-2	-5	-4	4	1	3	11	12	7	4	4	5	0	1	5	3	5	122	24	7.3
8	-5	0	1	1	4	3	0	-2	-5	-5	2	3	-1	10	11	48	35	67	3	3	4	2	2	-1	24	7.5
9	-1	3	3	2	-1	1	12	39	65	39	16	2	10	3	9	5	20	16	7	0	9	8	7	9	24	11.8
10	4	2	4	3	40	14	13	1	3	1	6	14	34	28	82	19	8	3	1	-2	-3	10	-3	3	24	11.9
11	-5	28	9	6	8	2	2	-4	1	-3	7	17	13	9	11	4	2	1	7	14	0	12	14	13	24	7.0
12	14	4	5	6	-1	-2	12	3	19	16	9	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	11	7.7
13	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	28	13	19	5	13	3	1	6	-5	6	1	11	8.2
14	7	4	1	2	0	7	-2	-5	4	71	10	12	2	7	13	12	5	14	2	5	5	8	7	16	24	8.6
15	8	-1	2	9	5	-3	4	-1	-1	3	7	16	13	35	24	14	-4	4	-5	7	-1	3	1	-5	24	5.6
16	19	-2	6	-2	23	12	-4	-1	103	-5	72	151	-5	3	-3	2	5	2	0	8	-3	2	5	8	24	16.5
17	-2	4	3	-2	4	15	9	14	9	8	5	27	4	9	0	-1	-2	8	7	10	9	10	-4	15	24	6.6
18	-3	2	4	15	2	13	11	1	2	13	19	10	21	11	8	13	10	8	8	15	15	23	14	11	24	10.3
19	9	27	28	-5	14	27	10	18	7	22	7	12	6	9	6	15	9	8	6	6	5	14	14	7	24	11.7
20	15	10	4	-3	-2	8	25	1	2	17	14	22	20	6	3	8	-1	7	7	11	2	9	8	2	24	8.1
21	0	7	0	2	0	9	10	7	9	13	4	8	11	12	13	10	8	3	11	4	5	1	19	6	24	7.2
22	7	8	14	15	-5	12	2	19	-2	-5	-5	-3	-2	0	0	-5	-1	0	3	-1	-3	-5	66	3	24	4.7
23	14	16	30	21	16	15	12	8	10	6	-5	-2	-3	1	2	6	-2	1	2	-3	2	-2	-1	4	24	6.2
24	4	-2	-4	5	-1	12	6	3	-5	-5	3	-5	7	6	3	-4	-3	5	-2	41	-2	2	1	-1	24	2.7
25	-5	0	4	1	-5	1	5	-5	7	3	-4	17	11	72	-5	5	25	33	20	28	9	15	12	21	24	11.0
26	6	15	4	8	-2	16	5	9	11	-1	-1	6	4	5	10	4	10	-2	8	5	10	11	6	8	24	6.5
27	0	2	-1	-3	-2	3	3	2	-5	2	4	1	5	15	15	235	19	34	0	5	6	5	13	14	24	15.5
28	-1	3	1	4	-5	4	1	2	10	0	-1	2	-5	3	0	-1	-3	-5	9	10	-4	20	1	0	24	1.9
29	6	24	-5	7	-2	-5	10	5	13	-2	5	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	15	11	13	14	6.8
30	12	20	12	23	16	5	17	5	1	11	13	10	29	11	12	12	13	-1	14	-2	3	2	10	-3	24	10.2
31	3	5	2	6	8	4	6	-4	AV	16	6	1	4	-3	8	-5	3	-1	12	1	3	-3	-4	0	23	3.0
NO.	30	30	30	30	30	30	30	30	29	30	30	28	28	29	29	29	28	29	29	29	29	30	30	30		
MAX.	19	28	30	60	64	27	25	39	103	71	72	151	34	72	82	235	35	67	20	41	93	23	66	122		
AVG.	5	6	6	6	6	6	6	4	9	8	8	13	8	13	12	16	7	9	5	7	7	8	9	10		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Warm Springs Site January 2009 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	-5	0	-5	6	-3	-3	-5	6	-5	-5	-1	2	0	-3	-2	BA	10	-5	-1	2	-2	0	-5	-2	23	-1.1
2	-4	-5	8	-5	-5	8	-1	3	-5	-4	10	AV	AV	AV	AV	-5	-4	-5	-5	-3	-1	-5	-4	1	20	-1.6
3	-5	1	-5	-3	7	1	-5	-5	6	-5	-1	7	-5	-5	1	3	-3	-1	-2	-1	-5	-5	-4	-5	24	-1.6
4	14	-5	-5	-4	3	-5	9	7	-4	5	-3	1	-5	-2	-2	1	4	-5	-5	-5	-3	-5	6	-5	24	-0.5
5	-1	6	-5	-2	16	0	4	0	-5	3	-4	-5	6	-3	-5	-5	2	-5	1	-5	-5	-3	1	-5	24	-0.8
6	4	-4	3	-5	-5	2	1	-3	0	-5	-5	0	-5	-5	-5	3	3	2	2	-5	-2	-5	1	7	24	-1.1
7	-3	2	-5	1	1	1	-4	-3	0	-5	-1	-1	-2	1	-5	4	-2	1	3	-5	10	-5	-1	0	24	-0.8
8	-3	-5	-4	7	4	-3	-5	-3	-5	-5	1	-5	-3	8	-5	-4	-2	2	-5	-4	3	-3	-3	3	24	-1.6
9	-2	3	2	-5	4	4	3	7	-5	-5	-1	-1	1	-5	12	-5	6	0	-5	-5	-3	5	-5	-4	24	-0.2
10	-2	-5	-3	-5	-5	6	-3	-5	-1	4	-5	-2	-5	10	-4	-3	6	0	3	-5	6	-5	-5	-2	24	-1.3
11	2	-2	11	-2	-4	-5	-2	-4	-5	-2	2	-2	-2	-2	1	2	-1	12	-1	6	-3	-3	0	-5	24	-0.4
12	-4	4	2	6	4	-5	-5	0	-5	-2	-5	-5	8	-5	-1	-3	3	-4	4	4	-5	4	-3	4	24	-0.4
13	-1	0	-1	0	2	7	4	5	0	-3	3	0	10	-5	3	0	-5	-5	-1	-1	-1	9	-1	9	24	1.2
14	2	9	-2	-2	1	-4	-5	1	-5	8	-1	-1	-5	3	-2	9	-5	6	-3	3	-2	3	-1	6	24	0.5
15	-5	3	-5	0	9	0	6	-5	-5	7	1	0	-4	-5	2	2	3	-5	8	14	-3	-5	0	10	24	1.0
16	-1	-5	13	6	-5	-5	-5	10	-5	8	2	-3	BA	10	-4	17	10	-5	16	9	5	5	5	3	23	3.5
17	12	9	0	4	13	-1	-5	9	-5	8	2	4	12	-4	6	6	0	-5	12	-3	6	16	6	11	24	4.7
18	4	-5	15	-5	14	6	7	4	1	0	5	8	11	2	15	16	-1	-2	18	9	14	-1	33	17	24	7.7
19	2	14	8	4	21	1	18	8	-5	16	20	6	5	6	3	9	-1	-3	22	1	14	10	25	-5	24	8.3
20	17	8	-5	13	10	-5	36	38	-5	37	9	9	5	9	14	20	24	1	28	12	9	17	24	10	24	14.0
21	24	8	15	18	22	4	16	5	5	9	-5	27	14	15	14	10	17	-1	13	18	9	37	-5	14	24	12.6
22	23	8	19	15	2	11	-5	22	-1	-2	1	5	19	4	12	-2	10	7	12	AM	11	11	4	17	23	8.8
23	-5	14	5	2	16	-5	28	2	20	2	-1	3	10	11	20	5	22	-2	27	0	13	18	12	14	24	9.6
24	15	11	10	9	17	5	21	16	13	0	14	7	-5	26	10	2	24	13	26	21	AM	AM	AM	AM	20	12.8
25	AM	34	46	18	49	8	33	10	5	-4	-4	24	13	0	0	4	1	-3	10	4	-4	10	3	-2	23	11.1
26	4	-2	-4	-1	2	5	3	-2	-5	-5	1	-5	-5	-5	-5	7	-5	4	3	19	-5	2	9	3	24	0.5
27	13	-3	9	12	-5	-5	-3	-1	-3	-1	-5	-5	24	-5	-4	1	15	94	36	25	29	32	19	15	24	11.8
28	-5	5	-5	-5	17	-5	2	3	-3	-5	0	-3	1	-2	-1	0	-5	-5	5	-5	5	-3	6	2	24	-0.3
29	-5	0	-1	-5	-5	4	-5	1	-5	2	-5	-5	-5	3	1	-3	6	-5	-5	2	13	-5	-5	6	24	-1.1
30	-5	9	-5	-1	10	-5	-5	17	-4	0	-2	2	16	-1	-5	-5	7	-3	1	-1	-1	2	28	11	24	2.5
31	54	13	120	84	12	11	-3	4	-3	-1	0	0	6	2	4	4	0	1	-5	6	-1	-5	0	-5	24	12.4
NO.	30	31	31	31	31	31	31	31	31	31	31	30	29	30	30	30	31	31	31	30	30	30	30	30		
MAX.	54	34	120	84	49	11	36	38	20	37	20	27	24	26	20	20	24	94	36	25	29	37	33	17		
AVG.	4	4	7	5	7	1	4	5	-1	2	1	2	4	2	2	3	4	2	7	4	3	4	5	4		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Warm Springs Site February 2009 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																								
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	16	-5	10	4	-5	0	3	-5	0	0	-4	-5	6	-5	-5	16	-5	5	-5	6	-5	6	-2	-4	24	0.7
2	-2	-5	4	-5	7	-5	7	5	-5	6	-5	BA	8	7	-5	2	0	2	6	1	9	-5	-5	16	23	1.7
3	-5	3	4	-3	-2	-3	-5	11	-5	-5	20	-5	6	-5	2	3	7	-5	-5	12	1	5	-5	2	24	1.0
4	-1	-5	-4	3	-5	-5	-2	6	-5	-3	12	6	13	-1	10	7	-4	-5	-1	6	-2	-5	2	1	24	0.8
5	-5	-5	12	-5	4	7	-1	3	-1	0	5	3	6	4	4	1	1	5	0	-4	3	0	1	-1	24	1.5
6	3	4	-5	13	-5	0	2	6	-5	5	5	3	4	3	-5	8	-5	1	-5	-5	4	4	2	9	24	1.7
7	-5	-4	17	2	1	-5	-5	12	-5	8	2	-2	-1	5	0	2	8	-5	3	6	3	3	-3	9	24	1.9
8	-1	5	4	3	-5	3	-5	10	-5	2	2	-5	17	11	-3	3	5	-5	6	5	-1	6	-2	27	24	3.2
9	-5	18	5	9	14	14	5	19	3	19	6	6	1	-2	-5	5	-1	0	6	1	-3	2	-5	15	24	5.3
10	-5	4	4	19	-5	-2	2	-3	-5	12	1	-4	-5	9	-3	-2	0	-4	4	-5	-2	1	-1	-2	24	0.3
11	-5	16	-5	2	-5	2	2	-3	2	-5	AH	-5	19	4	-3	4	4	2	1	8	-2	15	8	-4	23	2.3
12	2	-4	-5	-5	-5	15	-1	-5	-5	3	12	-5	BA	BA	18	-3	-2	-5	12	1	10	3	6	10	22	2.1
13	3	3	-5	22	-5	1	-2	7	-5	-5	-3	6	2	3	2	-4	-5	-5	-5	3	3	19	1	1	24	1.3
14	0	2	-5	21	-5	4	4	-5	2	-5	-1	-5	2	1	5	3	6	8	15	4	15	-5	7	1	24	2.9
15	19	0	4	10	7	0	-5	-2	-5	-5	-2	5	-1	-3	-5	7	-4	-5	-1	-2	-5	-2	3	0	24	0.3
16	14	-5	-5	0	-5	-3	-5	3	-5	3	-4	-5	4	-3	5	1	-5	5	-5	8	0	-3	-5	6	24	-0.4
17	3	7	-1	10	-2	7	8	-1	-5	8	8	6	3	11	14	2	-4	-1	7	-4	5	-2	3	-5	24	3.2
18	2	2	2	1	3	-5	9	-4	-1	-5	-4	6	-4	11	-1	-2	7	-4	5	10	-5	7	-5	-4	24	0.9
19	2	-1	-5	5	1	3	1	-4	1	-5	5	-1	1	5	4	2	-4	-5	-1	0	-5	-2	-5	3	24	-0.2
20	-1	-4	-5	-1	1	0	-5	7	-1	4	28	18	12	11	5	BA	11	2	-5	6	0	12	-5	9	23	4.3
21	2	8	-1	2	-1	-5	8	-5	16	-4	-4	11	2	-1	1	0	1	-5	4	7	2	7	12	5	24	2.6
22	7	2	-2	-5	9	12	-4	-5	14	2	8	1	1	6	1	2	-5	9	-1	7	-2	2	1	7	24	2.8
23	-5	2	2	5	18	0	3	-5	21	0	11	9	-4	1	-2	-1	2	-2	-5	-3	-4	3	-5	9	24	2.1
24	0	-3	6	-5	-5	14	13	-5	22	-1	-1	-1	6	1	2	1	-1	-5	7	-2	2	6	-5	5	24	2.1
25	-4	-4	1	4	-2	-5	-5	-3	-5	11	-5	1	1	-5	1	-5	3	4	6	12	-5	8	12	-5	24	0.5
26	4	-4	-1	-1	-5	-1	-5	-5	1	4	-2	14	23	6	24	AM	AM	AM	AM	AM	0	-5	17	10	19	3.9
27	-5	5	-4	-3	-5	5	-5	-1	-5	4	-5	-4	2	4	-5	-3	-5	3	2	-5	-2	4	-5	5	24	-1.2
28	11	-5	-1	5	-5	3	10	-5	19	0	1	19	15	5	19	3	-2	-4	12	-5	9	6	-1	6	24	4.8
NO.	28	28	28	28	28	28	28	28	28	28	27	27	27	27	28	26	27	27	27	27	28	28	28	28		
MAX.	19	18	17	22	18	15	13	19	22	19	28	19	23	11	24	16	11	9	15	12	15	19	17	27		
AVG.	1	1	1	4	0	2	1	1	1	2	3	2	5	3	3	2	0	-1	2	3	1	3	1	5		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Warm Springs Site March 2009 (All values are PM10 in micrograms per cubic meter at Local temperature and pressure)

	Hour Beginning																									
DAY	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	OBS	MEAN
1	6	-2	-5	-4	-5	4	-5	2	7	5	13	-5	2	3	5	9	-2	3	6	5	14	13	30	6	24	4.4
2	-5	10	-5	-4	0	-2	5	5	-4	3	5	-3	7	BA	12	5	13	-1	-5	4	3	6	-2	4	23	2.2
3	13	2	0	10	-5	8	-5	0	-4	-2	8	11	-2	-1	-5	29	-5	13	-5	-5	8	7	20	-5	24	3.5
4	9	-1	0	18	-1	4	-5	-5	9	-5	6	-3	5	8	-2	1	-5	5	-1	1	-5	0	7	2	24	1.8
5	-5	-4	-5	-5	7	-2	5	-5	-5	-1	-4	2	9	-3	18	37	17	6	2	-5	2	12	37	6	24	4.8
6	15	4	4	16	40	11	4	-2	14	0	-4	14	-5	8	7	4	1	4	-5	-1	3	15	2	-5	24	6.0
7	-1	-4	0	-5	-3	5	0	-5	2	-5	-5	4	2	14	-5	7	2	-2	4	1	7	-5	4	0	24	0.5
8	11	3	-1	-4	-5	3	-5	-5	-5	0	0	-5	-1	7	15	-5	6	23	7	1	-3	-5	-5	-5	24	0.9
9	8	1	0	3	5	2	8	4	-4	5	0	3	4	1	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	14	2.9
10	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	0	#DIV/0!
11	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	BA	25	6	2	1	4	1	7	-5	4	-2	9	-1	12	4.3
12	-4	6	-5	4	-5	3	4	-5	-5	4	-1	-5	9	7	0	3	-2	-2	-5	9	11	8	6	-2	24	1.4
13	21	0	16	-5	22	-5	-5	-5	-5	-3	8	6	7	6	12	6	3	-5	-2	0	9	-5	1	-5	24	3.0
14	-4	2	1	-5	-5	-5	-5	-5	-3	2	8	8	13	9	6	12	1	5	-2	9	1	1	2	2	24	2.0
15	-3	7	10	4	1	2	11	-5	-4	0	5	5	12	18	9	5	2	5	-5	3	5	-5	15	7	24	4.3
16	-3	12	-5	-4	-5	14	-5	12	1	4	18	-3	25	8	-5	0	-2	-5	8	1	5	-5	10	-5	24	3.0
17	-5	5	6	-5	9	15	-5	13	-5	4	7	7	-5	3	5	-5	6	-5	-2	7	1	0	12	1	24	2.7
18	8	-5	-3	-5	-5	11	-5	7	7	-5	14	15	3	11	7	-4	8	5	11	6	12	10	5	0	24	4.5
19	12	21	9	6	-1	3	7	-4	-5	13	13	9	1	3	17	0	9	-3	4	-4	0	1	16	5	24	5.5
20	12	8	12	4	17	2	6	-5	-5	9	4	9	9	9	9	10	1	-5	1	1	3	11	-2	10	24	5.4
21	6	11	2	7	6	9	3	17	-1	3	8	8	2	-2	3	-4	9	2	7	2	4	-5	3	-5	24	4.0
22	0	-5	-1	18	-5	4	-5	-5	-5	-4	BA	16	11	2	-2	-2	-5	0	3	-4	-5	-3	8	3	23	0.6
23	7	11	1	3	19	14	22	10	2	-5	3	-5	11	-5	-4	0	1	-5	16	2	3	11	-5	-5	24	4.3
24	-5	-5	4	-5	19	-5	17	4	-5	5	11	-5	6	7	1	-4	6	14	-5	-5	17	7	-5	-5	24	2.7
25	-5	-5	-5	1	-5	-5	-5	-5	-5	-5	4	7	2	8	1	3	1	53	4	2	13	-5	5	0	24	2.3
26	16	6	12	6	1	3	8	-5	-5	-1	8	-3	-5	7	-1	8	2	-5	0	11	2	2	-5	10	24	3.0
27	3	7	-5	-5	4	5	3	3	-5	-4	-1	-5	12	0	9	4	-1	-5	-5	2	-3	7	-3	4	24	0.9
28	-5	1	2	6	3	2	8	0	5	-5	0	-4	-3	-1	2	-2	-2	-5	-2	14	3	10	-2	26	24	2.1
29	AM	13	18	4	-1	-3	4	-4	7	-4	-3	2	7	AM	AM	AM	AM	AM	3	7	3	5	27	15	18	5.6
30	-5	1	3	5	4	16	1	-5	16	3	9	8	13	4	4	8	-5	-5	16	-5	9	-2	9	5	24	4.5
31	-5	6	1	1	5	9	3	-2	5	6	2	-1	0	-5	2	-3	6	-5	11	-3	-5	7	-5	4	24	1.4
NO.	28	29	29	29	29	29	29	29	29	29	28	29	30	28	28	28	28	28	29	29	29	29	29	29		
MAX.	21	21	18	18	40	16	22	17	16	13	18	16	25	18	18	37	17	53	16	14	17	15	37	26		
AVG.	3	4	2	2	4	4	2	0	0	1	5	3	6	5	4	4	2	3	2	2	4	3	7	2		

Note: Negative values and method detection limits will be addressed in the 2009 Annual Report.

Qualifier Codes and Descriptions

as of 12-APR-07

Qualifier Type	Qualifier Type Desc	Qualifier Code	Qualifier Desc
EX	Exceptional Event Qualifier	D	SANDBLASTING
		F	STRUCTURAL FIRE
		H	CHEMICAL SPILLS & INDUST. ACCIDENTS
		I	UNUSUAL TRAFFIC CONGESTION
		J	CONSTRUCTION/DEMOLITION
		K	AGRICULTURAL TILLING
		L	HIGHWAY CONSTRUCTION
		M	REROUTING OF TRAFFIC
		N	SANDING/SALTING OF STREETS
		O	INFREQUENT LARGE GATHERINGS
		P	ROOFING OPERATIONS
		Q	PRESCRIBED BURNING
		R	CLEAN UP AFTER A MAJOR DISASTER
NAT	Natural Event Qualifier	A	HIGH WINDS
		B	STRATOSPHERIC OZONE INTRUSION
		C	VOLCANIC ERUPTIONS
		E	FOREST FIRE
		G	HIGH POLLEN COUNT
		S	SEISMIC ACTIVITY
		U	SAHARA DUST
NULL	Null Data Qualifier	AA	SAMPLE PRESSURE OUT OF LIMITS
		AB	TECHNICIAN UNAVAILABLE
		AC	CONSTRUCTION/REPAIRS IN AREA
		AD	SHELTER STORM DAMAGE
		AE	SHELTER TEMPERATURE OUTSIDE LIMITS
		AF	SCHEDULED BUT NOT COLLECTED
		AG	SAMPLE TIME OUT OF LIMITS
		AH	SAMPLE FLOW RATE OUT OF LIMITS
		AI	INSUFFICIENT DATA (CANNOT CALCULATE)
		AJ	FILTER DAMAGE
		AK	FILTER LEAK
		AL	VOIDED BY OPERATOR
		AM	MISCELLANEOUS VOID
		AN	MACHINE MALFUNCTION
		AO	BAD WEATHER
		AP	VANDALISM
		AQ	COLLECTION ERROR
		AR	LAB ERROR
		AS	POOR QUALITY ASSURANCE RESULTS
		AT	CALIBRATION
		AU	MONITORING WAIVED
		AV	POWER FAILURE (POWR)
		AW	WILDLIFE DAMAGE
		AX	PRECISION CHECK (PREC)
		AY	Q C CONTROL POINTS (ZERO/SPAN)
		AZ	Q C AUDIT (AUDT)

		BA	MAINTENANCE/ROUTINE REPAIRS
		BB	UNABLE TO REACH SITE
		BC	MULTI-POINT CALIBRATION
		BD	AUTO CALIBRATION
		BE	BUILDING/SITE REPAIR
		BF	PRECISION/ZERO/SPAN
		BG	Missing ozone data not likely to exceed level of standard
		BH	Interference/co-elution
		BI	Lost or damaged in transit
		BJ	Operator Error
		BK	Site computer/data logger down
		SA	Storm Approaching
QA	Quality Assurance Qualifier	1	Deviation from a CFR/Critical Criteria Requirement
		2	Operational Deviation
		3	Field Issue
		4	Lab Issue
		5	Outlier
		6	QAPP Issue
		7	Below Lowest Calibration Level
		9	Negative value detected - zero reported
		MD	Value between MDL and IDL
		ND	No Value Detected
		SQ	Values Between SQL and MDL
		V	VALIDATED VALUE
		W	FLOW RATE AVERAGE OUT OF SPEC.
		X	FILTER TEMPERATURE DIFFERENCE OUT OF SPEC.
		Y	ELAPSED SAMPLE TIME OUT OF SPEC.

ATTACHMENT 1

LABORATORY ANALYTICAL REPORTS

Note: Non-applicable portions of laboratory reports have been excluded.

Tuesday, March 10, 2009

Analytical Laboratory

Steve Heck
Kuipers & Associates, LLC
P.O. Box 641
Butte, MT 59703

RE: DUSTFALL BUCKETS

Work Order: 0901039

Dear Steve Heck:

MSE Lab Services received 3 sample(s) on 1/9/2009 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Marcee Cameron

Marcee Cameron
Laboratory Director/ Chemist
406-494-7371

Enclosure

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

E-MAILED
3/11/09 MC

MSE Lab Services

Date: *10-Mar-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0901039
Project: DUSTFALL BUCKETS
Lab ID: 0901039-001

Client Sample ID: KA-DF-OPP-003
Collection Date: 1/6/2009 2:30:00 PM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	10.2	0.061		µg/L	1	3/3/2009
Cadmium	0.168	0.004		µg/L	1	3/3/2009
Copper	8.35	0.051		µg/L	1	3/3/2009
Lead	1.12	0.008		µg/L	1	3/3/2009
Zinc	13.9	0.122		µg/L	1	3/4/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TOTAL SOLIDS	18	10		mg/L	1	1/29/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE Lab Services

Date: *10-Mar-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0901039
Project: DUSTFALL BUCKETS
Lab ID: 0901039-002

Client Sample ID: KA-DF-WS-003
Collection Date: 1/6/2009 1:30:00 PM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	13.5	0.067		µg/L	1	3/3/2009
Cadmium	0.109	0.004		µg/L	1	3/3/2009
Copper	13.9	0.056		µg/L	1	3/3/2009
Lead	1.45	0.009		µg/L	1	3/3/2009
Zinc	21.4	0.134		µg/L	1	3/4/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TDS	34	10		mg/L	1	1/29/2009

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *10-Mar-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0901039
Project: DUSTFALL BUCKETS
Lab ID: 0901039-003

Client Sample ID: KA-DF-FB-003
Collection Date: 1/6/2009 1:30:00 PM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	0.429	0.052		µg/L	1	3/3/2009
Cadmium	0.063	0.003		µg/L	1	3/3/2009
Copper	0.082	0.043		µg/L	1	3/3/2009
Lead	0.008	0.007		µg/L	1	3/3/2009
Zinc	0.266	0.104		µg/L	1	3/4/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TOTAL SOLIDS	ND	10		mg/L	1	1/29/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 10-Mar-09
Report Date: 10-Mar-09

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 0901039
BatchID: 2278

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***2278-PB***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/3/2009***	
Arsenic	ND	1.50	µg/L							
Cadmium	ND	0.100	µg/L							
Copper	ND	1.25	µg/L							
Lead	ND	0.200	µg/L							
Sample ID: ***2278-LCS***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/3/2009***	
Arsenic	33.0	1.50	µg/L	40.00	82.5	80	120			
Cadmium	3.46	0.100	µg/L	4.000	86.5	80	120			
Copper	41.6	1.25	µg/L	40.00	104	80	120			
Lead	39.5	0.200	µg/L	40.00	98.7	80	120			
Sample ID: ***0901039-002A MS @ INST***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/3/2009***	
Arsenic	14.3	0.067	µg/L	1.786	44.9	70	130			NA
Cadmium	2.05	0.004	µg/L	2.232	86.8	70	130			
Copper	23.9	0.056	µg/L	11.16	89.9	70	130			
Lead	2.23	0.009	µg/L	0.8929	88.1	70	130			
Sample ID: ***0901039-002A MSD @ INST.***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/3/2009***	
Arsenic	14.4	0.067	µg/L	1.786	46.2	70	130	0.159	20	NA
Cadmium	2.04	0.004	µg/L	2.232	86.7	70	130	0.0224	20	
Copper	24.1	0.056	µg/L	11.16	91.0	70	130	0.521	20	
Lead	2.22	0.009	µg/L	0.8929	86.2	70	130	0.733	20	
Sample ID: ***2278-PB***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/4/2009***	
Zinc	ND	3.00	µg/L							
Sample ID: ***2278-LCS***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/4/2009***	
Zinc	765	3.00	µg/L	800.0	95.7	80	120			
Sample ID: ***0901039-002A MS @ INST***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/4/2009***	
Zinc	40.9	0.268	µg/L	22.32	87.2	70	130			
Sample ID: ***0901039-002A MSD @ INST.***			*Method:* ***SW6020A***		*Batch ID:* ***2278***				*Analysis Date:* ***3/4/2009***	
Zinc	40.2	0.268	µg/L	22.32	84.0	70	130	1.77	20	

Review

Qualifiers: S Spike Recovery outside accepted recovery limits R RPD outside accepted recovery limits

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 10-Mar-09
Report Date: 10-Mar-09

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 0901039
BatchID: R8956

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***LCS WC2018***			*Method:* ***A2540C***		*Batch ID:* ***R8956***			*Analysis Date:* ***1/29/2009***		
TDS	804	10	mg/L	833.0	96.5	80	120			
Sample ID: ***PB***			*Method:* ***A2540C***		*Batch ID:* ***R8956***			*Analysis Date:* ***1/29/2009***		
TDS	ND	10	mg/L							

Review

Qualifiers: S Spike Recovery outside accepted recovery limits R RPD outside accepted recovery limits

FORM MSE-169
(Init. 06/06)

MSE Technology Applications, Inc.
Laboratory Services

CHAIN OF CUSTODY

PROJECT ID: Kuipers and Associates
LABORATORY PERFORMING ANALYSIS:
SAMPLERS (Signature): Steven R Heck

ANALYSIS REQUESTED: As, Cd, Cu, Pb, Zn; TOTAL PARTICULATE

REMARKS: Turnaround Time (TAT)
- ☒ Standard TAT
- ☐ Rush TAT (please contact laboratory personnel for arrangements)

SAMPLE ID	LAB ID	DATE	TIME	As,Cd,Cu,Pb,Zn	TOTAL PARTICULATE	REMARKS
KA-DF-OPP-003	0901039-001A	1-6-09	1430	X	X	OPP 12-1-08 to 01-06-09
KA-DF-WS-003	002A	1-6-09	1330	X	X	WS 12-1-08 to 01-06-09
KA-DF-FB-003	003A	1-6-09	1330	X	X	FB 01-06-09

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME	COMMENTS
Steven R Heck	1-9-09	1150	Sara Ward	1/9/09	1150	Hand Delivered
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY		16.5°C no cooler/ice
Steven R Heck	Blacktail Cons.		Sara Ward	MSE-TA		
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME	
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY		
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME	
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY		

MSE LABORATORY SERVICES
200 Technology Way, P.O. Box 4078
Butte, MT 59701
PH: (406) 494-7334 / FAX: (406) 494-7230

MSE Lab Services

Sample Receipt Checklist

Client Name **KUIPERS&ASSOC** Date and Time Received: **1/9/2009 1:11:36 PM**

Work Order Number **0901039** RcptNo: **1** Received by **SW**

COC_ID: CoolerID:

Checklist completed by Signature 1-9-09 Date Reviewed by SW 1/9/09 Initials Date

Matrix: Carrier name: Hand-Delivered

Shipping container/cooler in good condition?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Blank ☐

Adjusted? NO Checked by BO 1-30-09

Any No and/or NA (not applicable) response must be detailed in the comments section bel

Client contacted: Date contacted: Person contacted

Contacted by: Regarding:

Comments: NO COOLER/ICE. TEMP=16.50C

Corrective Action

Wednesday, April 08, 2009

Analytical Laboratory

Steve Heck
Kuipers & Associates, LLC
P.O. Box 641
Butte, MT 59703

RE: DUSTFALL BUCKETS

Work Order: 0903020

Dear Steve Heck:

MSE Lab Services received 5 sample(s) on 3/3/2009 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Marcee Cameron

Marcee Cameron
Laboratory Director/ Chemist
406-494-7371

Enclosure

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

E-MAILED
4/8/09 MC

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903020
Project: DUSTFALL BUCKETS
Lab ID: 0903020-001

Client Sample ID: KA-DF-OPP-004
Collection Date: 3/2/2009 1:50:00 PM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	26.9	0.281		µg/L	1	4/2/2009
Cadmium	0.132	0.019		µg/L	1	4/2/2009
Copper	18.2	0.235		µg/L	1	4/2/2009
Lead	3.44	0.038		µg/L	1	4/2/2009
Zinc	38.7	0.563		µg/L	1	4/2/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TDS	17	10		mg/L	1	3/9/2009

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903020
Project: DUSTFALL BUCKETS
Lab ID: 0903020-002

Client Sample ID: KA-DF-OPP-005
Collection Date: 3/2/2009 1:50:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	1.54	0.245		µg/L	1	4/2/2009
Cadmium	0.069	0.016		µg/L	1	4/2/2009
Copper	5.49	0.205		µg/L	1	4/2/2009
Lead	1.11	0.033		µg/L	1	4/2/2009
Zinc	26.0	0.491		µg/L	1	4/2/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TDS	7	10	J	mg/L	1	3/9/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903020
Project: DUSTFALL BUCKETS
Lab ID: 0903020-003

Client Sample ID: KA-DF-WS-004
Collection Date: 3/2/2009 1:10:00 PM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	50.2	0.370		µg/L	1	4/2/2009
Cadmium	0.612	0.025		µg/L	1	4/2/2009
Copper	51.2	0.309		µg/L	1	4/2/2009
Lead	13.6	0.049		µg/L	1	4/2/2009
Zinc	46.4	0.741		µg/L	1	4/2/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TDS	25	10		mg/L	1	3/9/2009

Review

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903020
Project: DUSTFALL BUCKETS
Lab ID: 0903020-004

Client Sample ID: KA-DF-FB-004
Collection Date: 3/2/2009 1:10:00 PM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	0.062	0.157	J	µg/L	1	4/2/2009
Cadmium	0.121	0.010		µg/L	1	4/2/2009
Copper	0.143	0.131		µg/L	1	4/2/2009
Lead	1.01	0.021		µg/L	1	4/2/2009
Zinc	2.11	0.314		µg/L	1	4/2/2009
TOTAL DISSOLVED SOLIDS		**A2540C**				Analyst: **bo/kgw**
TDS	ND	10		mg/L	1	3/9/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903020
Project: DUSTFALL BUCKETS
Lab ID: 0903020-005

Client Sample ID: KA-ISO-001
Collection Date: 3/2/2009 11:15:00 AM
Matrix: AQUEOUS

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
SW-846 ICP-MS METALS, TOTAL		**SW6020A**		**E200.2**		Analyst: **SW**
Arsenic	2.37	3.00	J	µg/L	1	4/2/2009
Cadmium	0.381	0.200		µg/L	1	4/2/2009
Copper	2.14	2.50	J	µg/L	1	4/2/2009
Lead	0.516	0.400		µg/L	1	4/2/2009
Zinc	13.0	6.00		µg/L	1	4/2/2009

Review

Qualifiers:				
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 08-Apr-09
Report Date: 08-Apr-09

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 0903020
BatchID: 2326

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***2326-PB***			*Method:* ***SW6020A***		*Batch ID:* ***2326***			*Analysis Date:* ***4/2/2009***		
Arsenic	ND	1.50	µg/L							
Cadmium	0.052	0.100	µg/L							J
Copper	0.582	1.25	µg/L							J
Lead	0.116	0.200	µg/L							J
Zinc	0.947	3.00	µg/L							J
Sample ID: ***2326-LCS***			*Method:* ***SW6020A***		*Batch ID:* ***2326***			*Analysis Date:* ***4/2/2009***		
Arsenic	15.9	1.50	µg/L	20.00	79.7	80	120			
Cadmium	1.66	0.100	µg/L	2.000	83.0	80	120			
Copper	20.4	1.25	µg/L	20.00	102	80	120			
Lead	19.3	0.200	µg/L	20.00	96.7	80	120			
Zinc	326	3.00	µg/L	400.0	81.4	80	120			
Sample ID: ***0903020-001A MS @ INST.***			*Method:* ***SW6020A***		*Batch ID:* ***2326***			*Analysis Date:* ***4/2/2009***		
Arsenic	30.0	0.281	µg/L	3.752	82.8	70	130			NA
Cadmium	4.17	0.019	µg/L	4.690	86.2	70	130			
Copper	41.3	0.235	µg/L	23.45	98.8	70	130			
Lead	5.15	0.038	µg/L	1.876	91.6	70	130			
Zinc	78.9	0.563	µg/L	46.90	85.7	70	130			
Sample ID: ***0903020-001A MSD @ INST.***			*Method:* ***SW6020A***		*Batch ID:* ***2326***			*Analysis Date:* ***4/2/2009***		
Arsenic	29.2	0.281	µg/L	3.752	61.5	70	130	2.70	20	NA
Cadmium	4.08	0.019	µg/L	4.690	84.2	70	130	2.29	20	
Copper	40.5	0.235	µg/L	23.45	95.4	70	130	1.90	20	
Lead	5.05	0.038	µg/L	1.876	86.2	70	130	1.97	20	
Zinc	77.0	0.563	µg/L	46.90	81.6	70	130	2.43	20	

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: *08-Apr-09*
Report Date: *08-Apr-09*

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 0903020
BatchID: R9230

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***LCS WC2027***			*Method:* ***A2540C***		*Batch ID:* ***R9230***			*Analysis Date:* ***3/9/2009***		
TDS	821	10	mg/L	833.0	98.6	80	120			
Sample ID: ***PB***			*Method:* ***A2540C***		*Batch ID:* ***R9230***			*Analysis Date:* ***3/9/2009***		
TDS	ND	10	mg/L							

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

FORM MSE-169
(Init. 06/06)

MSE Technology Applications, Inc.
Laboratory Services

CHAIN OF CUSTODY

PROJECT ID: Kuipers + Associates

LABORATORY PERFORMING ANALYSIS:

SAMPLERS (Signature): Steven R Heck

SAMPLE ID	LAB ID	DATE	TIME	ANALYSIS REQUESTED: As, Cd, Cu, Pb, Zn	ANALYSIS REQUESTED: TOTAL PARTICULATE	REMARKS
KA-DF-OPP-004	0903020-001A	3-2-09	1350	X	X	OPP 1-6-09 to 3-2-09
KA-DF-OPP-005	002A	3-2-09	1350	X	X	OPP 1-6-09 to 3-2-09 (no alcohol)
KA-DF-WS-004	003A	3-2-09	1310	X	X	WS 1-6-09 to 3-2-09
KA-DF-FB-004	004A	3-2-09	1310	X	X	FB 3-2-09 (no alcohol)
KA-ISO-001	005A	3-3-09	1115	X		Screen on alcohol

REMARKS

Turnaround Time (TAT)

~~X~~ Standard TAT

☐ Rush TAT (please contact laboratory personnel for arrangements)

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
Steven R Heck	3-3-09	1116	Sara Ward	3/3/09	1116
PRINTED NAME: Steven R. Heck	COMPANY: Blacktail Cons		PRINTED NAME: Sara Ward	COMPANY: MSE-TA	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	

COMMENTS: n/d in box / no ice 14.5°C

MSE LABORATORY SERVICES
200 Technology Way, P.O. Box 4078
Butte, MT 59701
PH: (406) 494-7334 / FAX: (406) 494-7230

MSE Lab Services

Sample Receipt Checklist

Client Name **KUIPERS&ASSOC** Date and Time Received: **3/3/2009 1:42:54 PM**

Work Order Number **0903020** RcptNo: **1** Received by **SW**

COC_ID: CoolerID:

Checklist completed by Signature 3-3-09 Date Reviewed by Initials SW 3/5/09 Date

Matrix: Carrier name: Hand-Delivered

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	Blank ☐

Adjusted? NO Checked by RO 3-3-09

Any No and/or NA (not applicable) response must be detailed in the comments section bel

Client contacted: Date contacted: Person contacted

Contacted by: Regarding:

Comments: REC'D IN BOX. ~~TEMP=N/A(SOLID)~~ Temp= 14.5°C

Corrective Action

Wednesday, April 08, 2009

Analytical Laboratory

Steve Heck
Kuipers & Associates, LLC
P.O. Box 641
Butte, MT 59703

RE: DUSTFALL BUCKETS

Work Order: 0903019

Dear Steve Heck:

MSE Lab Services received 2 sample(s) on 3/3/2009 for the analyses presented in the following report.

Please find enclosed analytical results for the sample(s) received at the MSE Laboratory.

If you have any questions regarding these test results, please feel free to call.

Sincerely,

Marcee Cameron

Marcee Cameron
Laboratory Director/ Chemist
406-494-7371

Enclosure

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

E-MAILED
4/8/09 MC

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903019
Project: DUSTFALL BUCKETS
Lab ID: 0903019-001

Client Sample ID: KA-SP-OPP-4-49049
Collection Date: 3/2/2009 1:50:00 PM
Matrix: FILTER

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
ICP-MS METALS, SOLID SAMPLES		**SW6020**		**SW3050B**		Analyst: **SW**
Arsenic	3.29	1.51		mg/Kg	1	4/2/2009
Cadmium	0.124	0.100		mg/Kg	1	4/2/2009
Copper	13.5	1.26		mg/Kg	1	4/2/2009
Lead	2.75	0.201		mg/Kg	1	4/2/2009
Zinc	33.8	3.01		mg/Kg	1	4/2/2009
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS		**MISC**				Analyst: **BO**
Sample/Filter Weight	0.0498	0.0001		g	1	3/30/2009

Review

Qualifiers:

E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE Lab Services

Date: *08-Apr-09*

CLIENT: Kuipers & Associates, LLC
Lab Order: 0903019
Project: DUSTFALL BUCKETS
Lab ID: 0903019-002

Client Sample ID: KA-SP-WS-4-49138
Collection Date: 3/2/2009 1:10:00 PM
Matrix: FILTER

Analyses	Result	Limit	Qualifier	Units	DF	Date Analyzed
FILTER & SAMPLE WEIGHT - FILTER ANALYSIS			**MISC**			Analyst: **BO**
Sample/Filter Weight	0.0507	0.0001		g	1	3/30/2009

Review

Qualifiers:				
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below the Reporting Limit	Limit	Instrument Reporting Limit
	MDL	Method Detection Limit	ND	Not Detected at the Method Detection Limit (MDL)

MSE-TA Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

MSE Analytical Laboratory
P.O. Box 4078
200 Technology Way
Butte, MT 59701
Lab: 406-494-7334
Fax: 406-494-7230
labinfo@mse-ta.com

Date: 08-Apr-09
Report Date: 08-Apr-09

QA/QC SUMMARY REPORT

Client: Kuipers & Associates, LLC
Project: DUSTFALL BUCKETS

Work Order: 0903019
BatchID: 2328

Analyte	Result	RL	Units	Spike Lvl	% Rec	Low Limit	High Limit	RPD	RPD Limit	Qualifier
Sample ID: ***2328-PB UNFILTERED***			*Method:* ***SW6020***		*Batch ID:* ***2328***			*Analysis Date:* ***4/2/2009***		
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	ND	0.300	mg/Kg							
Sample ID: ***2328-PB-FILTERED***			*Method:* ***SW6020***		*Batch ID:* ***2328***			*Analysis Date:* ***4/2/2009***		
Arsenic	ND	0.150	mg/Kg							
Cadmium	ND	0.010	mg/Kg							
Copper	ND	0.125	mg/Kg							
Lead	ND	0.020	mg/Kg							
Zinc	0.141	0.300	mg/Kg							
Sample ID: ***2328-LCS***			*Method:* ***SW6020***		*Batch ID:* ***2328***			*Analysis Date:* ***4/2/2009***		
Arsenic	109	0.149	mg/Kg	131.1	83.4	80	120			
Cadmium	49.3	0.010	mg/Kg	56.20	87.7	80	120			
Copper	56.1	0.124	mg/Kg	60.66	92.5	80	120			
Lead	316	0.020	mg/Kg	311.8	101	80	120			
Zinc	216	0.298	mg/Kg	250.2	86.4	80	120			
Sample ID: ***2328-LCS2***			*Method:* ***SW6020***		*Batch ID:* ***2328***			*Analysis Date:* ***4/2/2009***		
Arsenic	122	0.146	mg/Kg	128.8	94.6	80	120			
Cadmium	53.9	0.010	mg/Kg	55.21	97.6	80	120			
Copper	59.8	0.122	mg/Kg	59.60	100	80	120			
Lead	348	0.020	mg/Kg	306.3	114	80	120			
Zinc	237	0.293	mg/Kg	245.8	96.5	80	120			
Sample ID: ***0903019-001A MS @ INST.***			*Method:* ***SW6020***		*Batch ID:* ***2328***			*Analysis Date:* ***4/2/2009***		
Arsenic	20.8	1.51	mg/Kg	20.08	87.0	75	125			
Cadmium	22.4	0.100	mg/Kg	25.10	88.7	75	125			
Copper	135	1.26	mg/Kg	125.5	96.8	75	125			
Lead	12.2	0.201	mg/Kg	10.04	94.3	75	125			
Zinc	259	3.01	mg/Kg	251.0	89.8	75	125			
Sample ID: ***0903019-001A MSD@ INST.***			*Method:* ***SW6020***		*Batch ID:* ***2328***			*Analysis Date:* ***4/2/2009***		
Arsenic	20.8	1.51	mg/Kg	20.08	87.4	75	125	0.388	20	
Cadmium	22.6	0.100	mg/Kg	25.10	89.5	75	125	0.862	20	
Copper	136	1.26	mg/Kg	125.5	97.6	75	125	0.804	20	
Lead	12.2	0.201	mg/Kg	10.04	94.4	75	125	0.0697	20	
Zinc	259	3.01	mg/Kg	251.0	89.6	75	125	0.166	20	

Review

Qualifiers:
NA Sample conc. Is > 4*spike level
S Spike Recovery outside accepted recovery limits

FORM MSE-169
(Init. 06/06)

MSE Technology Applications, Inc.
Laboratory Services

CHAIN OF CUSTODY

PROJECT ID: Kuipers + Associates

LABORATORY PERFORMING ANALYSIS:

SAMPLERS (Signature): Steven R Heck

SAMPLE ID	LAB ID	DATE	TIME	ANALYSIS REQUESTED: Filter weights	ANALYSIS REQUESTED: As, Cd, Cu, Pb, Zn	REMARKS
KA-SP-OPP-4-49049	0903019-001A	3-2-09	1350	X	X	OPP 11-28-08 to 3-2-09
KA-SP-WS-4-49138	002A	3-2-09	1310	X	X	WS 11-28-08 to 3-2-09
						h/d in box - solid

REMARKS: Turnaround Time (TAT)

- ☑ Standard TAT
- ☐ Rush TAT (please contact laboratory personnel for arrangements)

RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
Steven R Heck	3-3-09	1123	Sara Ward	3/3/09	1123
PRINTED NAME: Steven R. Heck	COMPANY: Blackstail Cons.		PRINTED NAME: Sara Ward	COMPANY: MSE-TA	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	
RELINQUISHED BY (Signature)	DATE	TIME	RECEIVED BY (Signature)	DATE	TIME
PRINTED NAME	COMPANY		PRINTED NAME	COMPANY	

COMMENTS: Call Steve Heck at 498-4199 when ready to weigh. Will do metals analysis contingent on net weight.

MSE LABORATORY SERVICES
200 Technology Way, P.O. Box 4078
Butte, MT 59701
PH: (406) 494-7334 / FAX: (406) 494-7230

MSE Lab Services

Sample Receipt Checklist

Client Name **KUIPERS&ASSOC** Date and Time Received: **3/3/2009 1:29:40 PM**

Work Order Number **0903019** RcptNo: **1** Received by **SW**

COC_ID: CoolerID:

Checklist completed by Debbie Ortega 3-3-09 (Signature / Date) Reviewed by SW 3/5/09 (Initials / Date)

Matrix: Carrier name: Hand-Delivered

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shippping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☐	No ☑	
Water - VOA vials have zero headspace?	No VOA vials submitted ☑	Yes ☐	No ☐
Water - pH acceptable upon receipt? N/a	Yes ☐	No ☐	Blank ☐

Adjusted? Checked by RO 3-3-09

Canister filters

Any No and/or NA (not applicable) response must be detailed in the comments section bel

Client contacted: Date contacted: Person contacted

Contacted by: Regarding:

Comments: REC'D IN BOX. TEMP=N/A(SOLID)

Corrective Action